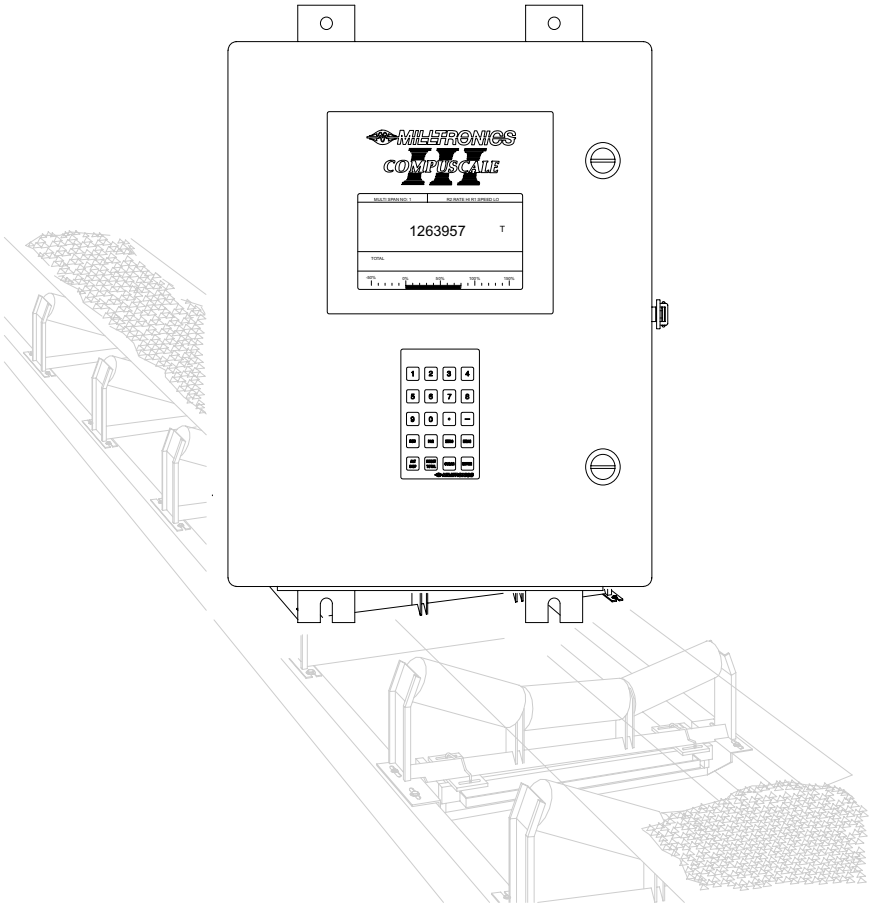
MILLTRONICS

COMPUSCALE III INTEGRATOR

Instruction Manual PL-367 January 2001



COMPUSCALE III

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

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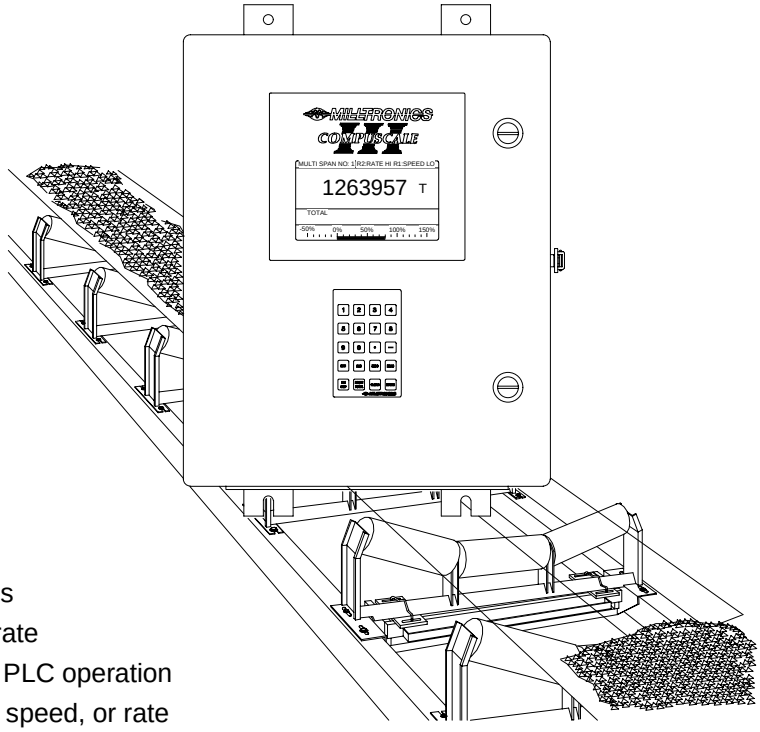
GENERAL INFORMATION

ABOUT THE COMPUSCALE III



The Milltronics CompuScale III is a microprocessor based integrator designed specifically for bulk dry solids in-line weighing applications.

The CompuScale III utilizes a load signal (from a belt scale such as the Milltronics MSI), and a speed input (from a speed sensor such as the Milltronics MD-36, or a programmed constant speed), to calculate the material rate. This rate is integrated over time to provide material totalization.

The CompuScale III provides:

» Load, Speed, Rate, and Total displays
» an analog mA output proportional to rate
» a relay contact for remote totalizer or PLC operation
» 2 alarm/control relays based on load, speed, or rate
» 2 ports for computer, remote terminal, PLC, or serial printer

The CompuScale III has three modes of operation; program, calibrate, and run.

The operator programs the CompuScale III via the keypad to provide displays and outputs in the desired units of measure. The CompuScale III displays the name, range of acceptable values, (and additional information/instruction) of the parameter (programming feature) accessed.

In the calibrate mode, the system Zero (empty belt) and Span (100% material rate) calibration is established. A test reference (test weight, test chain, or ECAL) is used to simulate the force of material applied to the belt scale during the Span calibration. A material test is normally performed to verify the calibration accuracy. If necessary, the material test results may be used to correct any deviation in calibration accuracy.

Calibration accuracy may be checked at any time. The results of this check are automatically compared to system calibration and the deviation is displayed. The operator may choose to continue operation with the previous calibration or the results of the calibration check.

All programming and calibration information is stored in non-volatile memory. If desired, the security parameter may be set to ensure the CompuScale III programming and calibration is not inadvertently altered in the run mode.

The run mode is the normal operating mode, providing dynamic measurement displays, analog mA output, and a variety of other features.

ABOUT THIS MANUAL

GENERAL

This instruction manual contains information essential to successful CompuScale III operation.

SPECIFICATIONS,	includes CompuScale III environmental, physical, and operational characteristics.
INSTALLATION,	indicates the typical mounting and interconnection procedure.
START UP,	prepares the CompuScale III for programming.
PROGRAMMING,	details the activities required to tailor the CompuScale III to the particular application.
CALIBRATION,	includes the CompuScale III input signal to output feature correlation procedure.
PARAMETERS,	describes the function, factory setting, and range of possible settings, of each parameter.
PROGRAMMING CHART,	provides a space to record programmed parameter values for future reference.
OPERATION,	describes initial and normal CompuScale III operation.
COMMUNICATION,	provides CompuScale III serial communication information.
APPENDICES,	Alphabetical Parameter List, Maintenance and Spare Parts, Error Messages, Trouble Shooting.
FIGURES,	includes a complete set of installation and interconnection drawings.

CONVENTIONS

Throughout this instruction manual the following symbols and presentation practices have been utilized:

[1234567ABCDEFG]	alpha numeric characters enclosed within these brackets represents information displayed by the CompuScale III display.
[T/h]	units of measure were arbitrarily chosen from the imperial set. The actual units displayed or otherwise applicable will be dependent upon operator programming.
	indicates the following CompuScale III keypad button is to be pressed.
"RUN" or	alpha numeric characters enclosed within quotation marks or this symbol represent a key on the CompuScale III keypad.
Italics	are used to identify the defined word(s) or phrase within a definition statement.

Information of a higher order of importance, is indented from both left and right margins and in bold print.

■

SPECIFICATIONS

COMPUSCALE III

Power:		» 100/115/200/230 V AC ± 10%, jumper selectable, 50/60 Hz, 65 VA
Fuses:	» Main (FU1)	» 3/4 Amp MDL SLO-BLO or equivalent
	» Speed Sensor (FU2)	» 1/4 Amp MDL SLO-BLO or equivalent
Operating Temperature:		» -20 to 50°C (-5 to 122°F)
Accuracy:		» ± 0.1% of span, typical
Resolution:		» ± 0.02% of span, typical
Inputs:	» Load cell:	» -20 to +45 mV DC per load cell
		» 4 load cells max.
	» LVDT:	» 0 to 0.75 Vrms, 3 kHz
	» Speed Sensor:	» 5-15 V DC pulses, 2 Hz to 10 kHz
	» Multispan:	» 4 contact inputs for up to 8 spans
	» Auto Zero	» contact input for enable
	» Keypad	» 20 key sealed membrane with tactile feedback
	» Printer	» contact input for print request
Outputs:	» Load cell: (excitation)	» 10 V DC, 250 mA max.
	» LVDT: (excitation)	» 2.0 Vrms, 3 kHz, 50 mArms max.
	» Speed Sensor: (excitation)	» 15 V DC, 150 mA max.
	» Analog:	» 4-20 mA (0-25 mA scaleable), isolated, proportional to rate
		» 0.1% resolution
		» 750 Ω max. load
	» Remote Totalizer:	» SPST sealed relay
		» 1 form "A" contact rated 2A at 250V AC, 100 VA max.
		» 25 msec. minimum contact closure duration
		» 15 closures per second max.

	» Alarm:	» 2 multipurpose relays for rate, load, or speed
		» 1 Form "C" SPDT contact per relay, rated 5A at 230 V AC
	» Communication:	» 1 relay, 4PDT used for communication loop dropout,
		» rated 1A at 230 V AC
	» Display:	» illuminated 256 x 128 dot matrix
Communication:		» 2 serial ports
		» RS232C and ± 20 mA current loop
Enclosure:		» NEMA4 style, steel construction with polycarbonate window
		» 330 mm W x 406 mm H x 102 mm D (13" W x 16" H x 4" D)
Shipping Weight:		» 11.0 Kg (24.3 lbs), no options

OPTIONS

Cable:	» Single load cell, 150m (500 ft) max. 20 AWG, 4 wire shielded, Belden 8404 or equivalent
	» Single load cell, 300m (1000 ft) max. 20 AWG, 6 wire shielded, Belden 8426 or equivalent
	» Dual load cell, 150 m (500 ft) max. 20 AWG, 6 wire shielded, Belden 8426 or equivalent
	» Dual load cell, 300 m (1000 ft) max. 20 AWG, 8 wire shielded, Belden 8418 or equivalent
	» LVDT, 150 m (500 ft) max. 20 AWG, 4 wire shielded, Belden 8404 or equivalent
	» Speed Sensor, 300 m (1000 ft) max. 18 AWG, 3 wire shielded, Belden 8770 or equivalent
Speed Sensor:	» Milltronics MD36 or MD2000A for speed input
LCPA-08 interface:	» For connection to MMI-3 or MMI-4 scale configurations
Incline Compensator:	» For variable incline conveyors
Barrier Strips:	» For hazardous location belt scales
Enclosure Heater:	» Recommended for operating temperatures below -10°C (14°F), or excessive humidity.
Relay:	» Food Grade remote totalizer relay
CVCC:	» For bipolar current/RS-232C interface
BIC-II:	» For 6 port bipolar current loop/RS-232C or RS-422 interface. ■

INSTALLATION

COMPUSCALE III

The CompuScale III should be mounted in an area that is within the specified temperature range, and that is suitable for Nema 4 style enclosures. The front cover should be accessible for keypad operation, display viewing, and have sufficient room to swing open.

It is advisable to keep the CompuScale III away from high voltage or current runs, contactors, SCR control drives and RF interference.

For proper totalizer relay operation, the CompuScale III must be mounted within 30° from vertical.

Refer to FIGURES.

Do not mount the CompuScale III in direct sunlight without the use of a sun shield.

INTERCONNECTION

Remove the enclosure bottom plate prior to drilling or punching cable/conduit entrance(s), to ensure metal filings do not come in contact with the CompuScale III electronics.

Load cell or LVDT, speed sensor, rate output, communication, and low voltage contact wiring may be run in a common conduit separated from power and high voltage contact wiring. Refer to Figures.

The power ground (TB1-50) is internally connected to SHLD connections (TB1-13,26 and TB2-5), and to the mother board bottom mounting lugs. COM connections (TB1-15,29,32,36,37, and TB2-8) are connected to power ground via jumper J2, (below TB1, between the mounting lugs). If the COM connections must be isolated from power ground, remove J2.

Refer to FIGURES.

All wiring must be performed in accordance with all governing regulations.

HAZARDOUS LOCATIONS

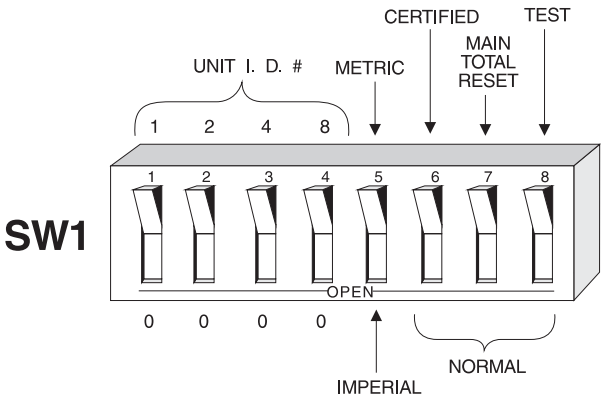
The CompuScale III cannot be mounted in an area classed as hazardous. Where the associated belt scale is mounted in a hazardous area, barrier strips must be used to isolate the CompuScale III from the hazardous area for intrinsic safety. Contact Milltronics or your local representative for hazardous application information.

■

START UP

HARDWARE SET UP

Prior to programming, SW1 and SW2 contacts must be set as required.



UNIT I.D.

The CompuScale III identification code factory setting is 00, as set by SW1 contacts 1 - 4.

When more than one CompuScale III is connected to a host computer or PLC, the identification code of each CompuScale III must be set to a different value.

UNIT I. D.	SW 1 1 2 3 4
00	O O O O
01	C O O O
02	O C O O
03	C C O O
04	O O C O
05	C O C O
06	O C C O
07	C C C O

UNIT I. D.	SW 1 1 2 3 4
08	O O O C
09	C O O C
10	O C O C
11	C C O C
12	O O C C
13	C O C C
14	O C C C
15	C C C C

O = switch contact open

C = switch contact closed

UNITS OF MEASURE

Two sets of Units are available; Imperial and Metric. Leave SW1 contact 5 (SW1-5) in the open position for Imperial, or closed for Metric units. Refer to PARAMETERS/P0 RATE UNITS for the Rate Unit options available.

SW1-5 must be set to the desired position <u>before</u> initial programming is performed. To alter the Units of Measure of a programmed CompuScale III, set SW1-5 as desired, then perform a Reset. Refer to Parameters / P99 Reset.

CERTIFICATION

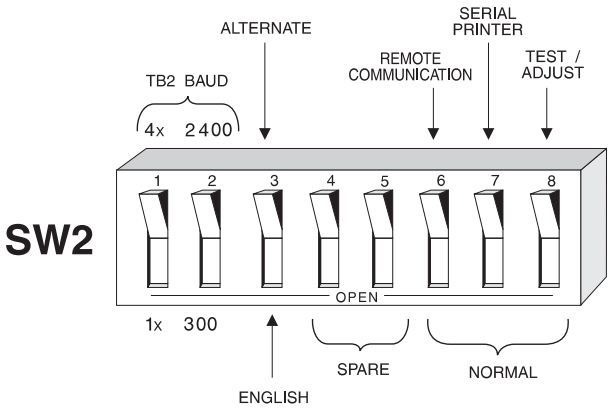
Leave SW1 contact 6 (SW1-6) in the open position for normal applications. Close SW1-6 for Certified Mode operation, after all programming and calibration is complete. Refer to Calibration / Calibration Alternatives.

TOTALIZER RESET

Leave SW1 contact 7 (SW1-7) in the open position for normal operation. When this contact is closed, the Main Total Display cannot be reset.

TEST MODE

Leave SW1 contact 8 (SW1-8) in the open position for normal operation. The closed position is reserved for Milltronics service personnel.



PORT 2 BAUD RATE

The CompuScale III TB2 communication port baud rate is independant of the PORT 1 baud rate, and is set by SW2 contacts 1 and 2. Set the baud as required by the device connected. The factory setting is 300 baud.

Baud Rate	SW2 1 2
300	O O
1200	C O
2400	O C
9600	C C

O = switch contact open

C = switch contact closed

LANGUAGE

Leave SW2 contact 3 (SW2-3) in the open position for English, or closed for alternate language, CompuScale III displays.

REMOTE COMMUNICATION

Leave SW2 contact 6 (SW2-6) open for normal operation. If a remote mounted CompuScale III is used, SW2-6 of the remote CompuScale III (only) must be closed.

PORT 2 COMMUNICATION MODE

Leave SW2 contact 7 (SW2-7) open for normal operation, or closed if a serial printer is connected to Port 2.

TEST/ADJUST MODE

Leave SW2 contact 8 (SW2-8) in the open position for normal operation. In the closed position, a test menu is displayed.

When the keypad test is selected, a graphical representation of the keypad is displayed. As each keypad button is depressed, the display indicates successful operation.

When the display contrast adjustment is selected, pressing "4" increases, and pressing "8" decreases the display contrast.

PRE START UP CHECKS

After the CompuScale III has been properly installed and interconnected, the following checks should be performed prior to connecting power:

» all cable connections are correct and secure.

» the proper voltage has been selected (J1 on the mother board).

» SW1 and SW2 have been set as required.

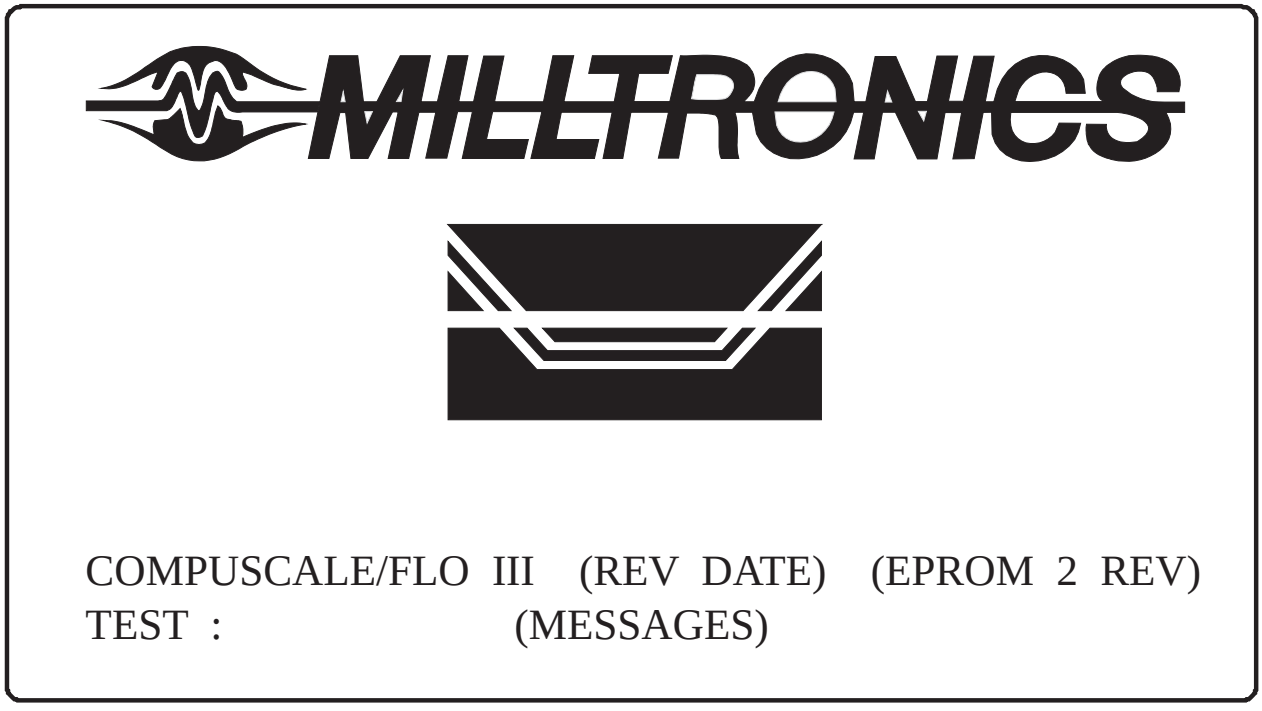
» the POWER switch is in the OFF position.

Connect power to TB1-51,52 and ground to TB1-50 of the CompuScale III. Ensure all connections are secure.

Do not operate the CompuScale III with the ground (earth) wire disconnected.

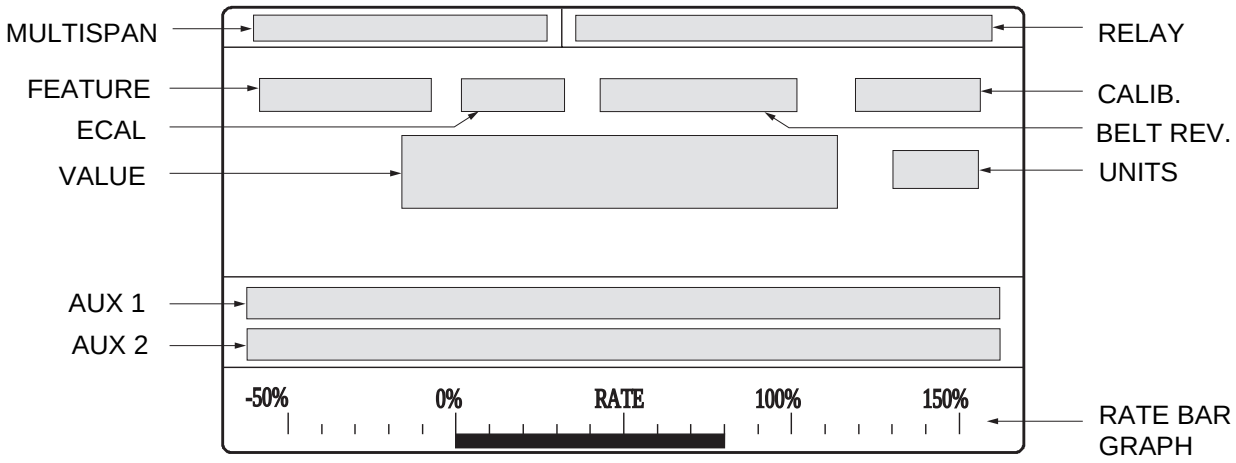
INITIAL START UP

Set the CompuScale III POWER switch to the ON position. The CompuScale III will enter the following initialization routine.



When the display initialization routine is complete, the display reverts to the last operating mode accessed. If the CompuScale III is not programmed, the parameter entry display is accessed.

The CompuScale III display is divided into the following fields:



FIELD	DESCRIPTION
MULTISPAN	current span calibration selected. If Multispan 0 is selected, the field is blank.
RELAY	current relay status (run mode). If relays are not used, or in non-alarm, the field is blank.
FEATURE	parameter number (parameter entry), calibration type (calibrate mode), Load, Speed, Rate or Total (run mode)
ECAL	indicates ECAL (simulated rate signal) is on. If ECAL is off, the field is blank.
BELT REV.	full belt revolutions remaining before calibration completion (calibrate mode).
CALIB	calibrate mode indicator. When displayed, totalizers are on HOLD (unless otherwise specified).
VALUE	the current value associated with the feature selected.
UNITS	the units of measure associated with the value displayed
AUX 1	parameter name (parameter entry), auxiliary message (calibrate mode), not used (run mode).
AUX 2	parameter value range (parameter entry), additional information or error message (any mode).
BAR GRAPH	represents current rate, displayed as percent of span (run mode).

■

PROGRAMMING

GENERAL

Information specific to a particular application is entered into the CompuScale III memory, via the keypad, prior to the calibration procedure.

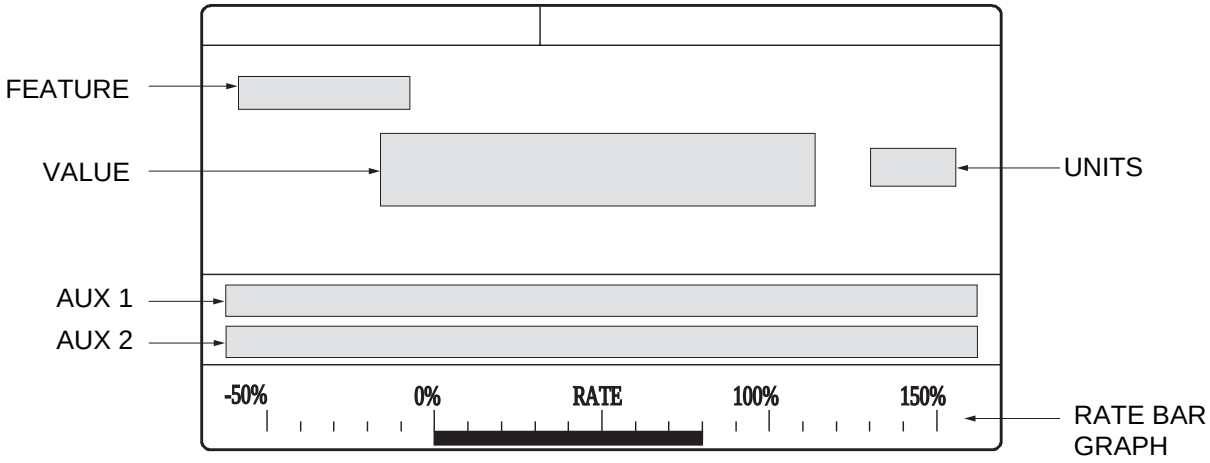
KEYPAD

Button	Operation	Function
0 – 9	parameter entry	numeric entries
4	parameter entry	increase: analog mA output (P17 and P18 only), ECAL value (P22 only)
8	parameter entry	decrease: analog mA output (P17 and P18 only), ECAL value (P22 only)
●	parameter entry	decimal point
−	parameter entry	negative entry or display previous parameter
RUN	any mode	enter the run mode, return to previously selected display
PAR	any mode	enter the program mode, access parameter for entry or viewing
ZERO	any mode	access zero calibration, view current zero count
SPAN	any mode	access span calibration, view current span count
ALT DISP	any mode	enter the run mode, select rate, total, load, or speed display
RESET TOTAL	any mode	enables a Total display reset (refer to Start Up\Hardware Set Up\Totalizer Reset)
CLEAR	parameter entry calibrate mode	clear display abort calibration
ENTER	parameter entry calibrate mode any mode	display parameter value, or store altered parameter value, or display next parameter activate zero or span calibration, or accept calibration results with total displayed, switch to alternate total (main or sub)

PARAMETER ENTRY

Application information must be entered into the appropriate CompuScale III memory locations. These locations are identified by a Parameter Number (P#). The information entered is referred to as a Parameter Value (Value). To enter information, the operator accesses the desired parameter number, views the parameter value displayed, and then accepts or alters the current parameter value.

Common Parameter Entry Display Fields.



DIRECT PARAMETER ACCESS

To directly access any parameter, , followed by the parameter number.
Only valid parameter numbers will be accepted. Refer to PARAMETERS for the list of valid parameter numbers.

e.g.

[PARAMETER] is displayed in the FEATURE field, if PARAMETER 0 is desired

[PARAMETER 0] is displayed in the FEATURE field,
[RATE UNITS] is displayed in the AUX 1 field.

To view the current parameter value and auxiliary messages for the displayed parameter,

[PARAMETER 0] is displayed in the FEATURE field
[1] is displayed in the VALUE field (unless previously altered)
[RATE UNITS] is displayed in the AUX 1 field
[1:T/h;2:LT/h;3:lb/h;4:lb/min] is displayed in the AUX 2 field (with SW1-5 open)

AUTOMATIC PARAMETER ACCESS

Upon accessing any parameter value, pressing "ENTER" will automatically access the next parameter in the programming sequence. Pressing "-" will automatically access the previous parameter.

e.g. with the VALUE field of PARAMETER 0 displayed...

[PARAMETER 1] is displayed in the FEATURE field
[0.0000] is displayed in the VALUE field (unless previously altered)
[T/h] is displayed in the UNITS field (SW1-5 OPEN)
[RATE] is displayed in the AUX 1 field
[ENTER VALUE] is displayed in the AUX 2 field

all fields associated with PARAMETER 0 are displayed

ALTERING PARAMETER VALUES

Once the desired parameter number is accessed, the parameter value may be accepted or altered as required.

e.g. if the VALUE field of PARAMETER 0 is 1 (T/h), however 2 (LT/h) is desired

[2] is displayed in the value field

the new value (2) is now stored in memory

LAST PARAMETER RECALL

From the Calibrate or Run mode, the last parameter accessed in the Program mode, may be recalled.

the last parameter accessed is displayed.

PARAMETER RESET

To reset parameters to factory settings, refer to PARAMETERS/P99 Reset.

PROGRAMMING SEQUENCE

Typically, the CompuScale III is programmed as follows:

a) Referring to the Belt Scale Design Summary and PARAMETERS section, copy the appropriate parameter values to the spaces provided on the PROGRAMMING CHART fold out.

b) Perform a MASTER RESET (P99).

c) Access each parameter in sequence from P0 and enter the parameter values from the PROGRAMMING CHART.

d) Perform a Zero and Span calibration (refer to CALIBRATION)

e) Perform Span Adjust (P8), or Factoring (P9), and Speed Adjust (P19) procedures, as required.

Remember to copy any parameter value alterations onto the PROGRAMMING CHART for future reference.

QUICK START GUIDE

A Quick Start Guide is shipped in the CompuScale III integrator enclosure. This guide describes the minimum start up, programming, and calibration requirements of the CompuScale III, to obtain successful RUN mode operation for most applications.

If desired, follow the Quick Start Guide procedure. Parameters which are not included in the guide may be programmed after the RUN mode is entered.

■

CALIBRATION

GENERAL

As belt and material load can vary with temperature and humidity, frequent calibration may be required to maintain system accuracy. A calibration should only be performed after the belt has been run as long as practical, and is sufficiently limber.

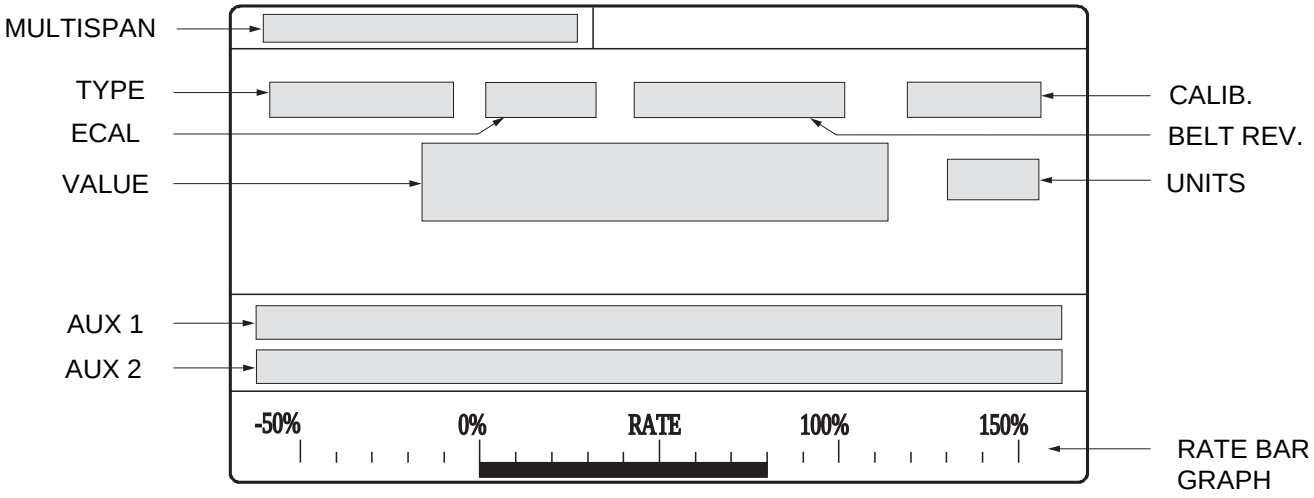
When the CompuScale III is first commissioned, several Zero and Span calibrations are normally performed to verify the calibration results are repeatable.

A Zero or Span calibration (in progress) may be aborted by

.

Should the belt speed fall below 5% of the design Belt Speed (P4) value, while a calibration is in progress, [SPEED < 5%; CALIB ABORTED] is displayed.

The CompuScale III calibration display is divided into the following fields:



INITIAL CALIBRATION REFERENCES

The first calibration performed, establishes the Initial Zero and Initial Span calibration references. Subsequent Zero and Span calibration results are compared to these references. The maximum acceptable deviation between an Initial Calibration Reference and a subsequent calibration result is 12.0% of span. Otherwise, [ZERO OUT OF RANGE] or [SPAN OUT OF RANGE] is displayed in the AUX 2 field.

While a calibration in progress is establishing an initial calibration reference, the dynamic count value is displayed. Otherwise, the dynamic load value is displayed.

The initial calibration references may be reset. Refer to Parameters/P77 Initial Zero Reset and P88 Initial Span Reset. Both initial calibration references (along with all other programming) are erased by a Reset (P99).

ZERO

The average load applied to the belt scale by the empty running belt is calculated and stored in memory as a Zero count. After the belt has run empty for sufficient time (15 minutes or more)...

[ZERO] is displayed in the FEATURE field. The current Zero counts are displayed in the VALUE field. [ENTER: CALIBRATE MODE] is displayed in the AUX 2 field.

to initiate the calibration. [CALIB] is displayed in the CALIB field and [ZERO IN PROGRESS] is displayed in the AUX 2 field. The time required to complete the calibration is dependent upon Belt Speed (P4), and Belt Length (P6). Calibration time (and accuracy) is also dependent upon Calibration Duration. (Refer to Parameters/P30 Calibration Duration.) The number of full belt revolutions remaining until completion, is displayed in the BELT REV field.

When complete, the deviation from the last Zero calibration is displayed in the Value field, as a percent of span.

SPAN

The simulated material load provide by the Test Weight (or number of Test Weights) is calculated and stored in memory as a Span count. (Refer to Alternate Test References, if a Test Weight is not used.)

With the belt running empty, and no Test Weight applied to the belt scale...

[SPAN] is displayed in the FEATURE field. The current Span counts are displayed in the VALUE field.

With [CALIB] displayed in the CALIB field, apply the Test Weight to the belt scale (as described in the belt scale manual).

If [CALIB] is not displayed, respond to the CompuScale III display prompts until this indicator is obtained, before applying the Test Weight.

to initiate the calibration. The time required to complete the calibration is dependent upon Belt Speed (P4), and Belt Length (P6). Calibration time (and accuracy) is also dependent upon Calibration Duration. (Refer to Parameters/P30 Calibration Duration.) The number of full belt revolutions remaining until completion, is displayed in the BELT REV field.

When complete, the deviation from the last Span calibration, is displayed in the VALUE field, as a percent of span.

to accept the new calibration. Otherwise, investigate the reason for the deviation and perform the Span calibration again.

CALIBRATION ACCURACY

With the Initial Zero and Initial Span calibration complete, RUN mode operation is possible, however greater calibration accuracy may be required. The Test Reference value (P7) is an approximation, and may require adjustment for maximum calibration accuracy to be achieved.

To adjust the Span calibration for maximum accuracy, perform a material test. (Refer to Parameters/P8 Span Adjust). The Test Reference value (P7) is automatically adjusted so the Test Weight will accurately simulate material load during future Span calibrations.

The CompuScale III is ready to be put into service, (refer to Operation).

CALIBRATION ALTERNATIVES

AUTO ZERO

This feature automatically performs a Zero calibration, whenever material flow ceases in the RUN mode.

If the Auto Zero feature is desired, provide a dry contact input to the CompuScale III terminals TB1-34 and TB1-37. The contact may be activated by a material feed controlling device such as a motor control, material control gate, or valve. The contact must be closed when the material feed is stopped.

When the contact is closed, and the belt is running empty (within 4% of span from the current zero reference) [AUTO ZERO IN PROGRESS] is displayed in the AUX 2 field. The time required for completion is dependent upon Belt Speed (P4), Belt Length (P6), and Calibration Duration (P30). The number of full belt revolutions remaining before completion is displayed in the BELT REV field.

When complete, the Auto Zero is compared to the last operator Zero.

If the Auto Zero is within 2% of span from the last operator zero, the CompuScale III briefly displays [CALIBRATION COMPLETE] in the AUX 2 field and the deviation from the current zero reference in the VALUE field. The Auto Zero is automatically accepted and RUN mode operation continues.

Otherwise, the Auto Zero results are rejected, and operation continues with the previous zero reference.

CERTIFICATION MODE

In this mode, parameters may be accessed for viewing. However, if a parameter value alteration is attempted, the alteration is not permitted and [CERTIFICATION LOCKOUT] is displayed in the AUX 2 field.

To activate the Certified Mode, close SW1 contact 6 (SW1-6) after the CompuScale III is programmed and calibrated.

The maximum acceptable deviation between the last Zero performed by the operator (before closing this contact) and any subsequent Zero, is limited to 2% of span. Span calibrations are not permitted in this mode.

ALTERNATE TEST REFERENCES

For most applications, a Test Weight is applied to the belt scale to simulate a material load for the Span calibration. Alternatively, a Test Chain or *ECAL* (CompuScale III internal reference) may be used for this purpose. A Test Chain may be recommended when performing material tests would be extremely inconvenient or impractical. ECAL is normally used when applying a Test Weight or Test Chain is impractical (especially when the belt scale is installed in a hazardous area).

When a Test Weight or Test Chain is used exclusively, Test Reference selection (P20) is not required.

Typically, when more than one Test Reference is utilized, one reference is considered the *Primary Reference* and the alternate reference(s) are considered the *Secondary Reference(s)*. After accepting the results of a Span calibration utilizing the Primary Reference (or after performing a Span Adjust), the Secondary Reference(s) should be selected (P20) and Factored (P9). Refer to Parameters/P7,P8,P9, and P20.

When the ECAL reference is selected (P20=1), ECAL is automatically applied when a Span calibration or Factoring (P9) is activated, and removed when the process is complete or aborted. When the ECAL reference is on, [ECAL] is displayed in the ECAL field.

ECAL CALIBRATION (Initial Reference)

With *Essential Parameters* (P0 through P7, and P21) programmed as required, select the ECAL Test Reference (P20=1). Access P7 again, [PARAMETER 7E] is displayed. (The "E" indicates the P7 value displayed is associated with the ECAL Test Reference).

Perform a Zero and Span calibration. (A Test Weight is not required as ECAL is automatically applied for Span calibrations when P20=1). To obtain an accurate ECAL/belt scale signal correlation, perform a material test. Refer to Parameters/P8 Span Adjust.

Upon the completion of the material test, the new ECAL Test Reference (P7E) value is automatically adjusted so ECAL will accurately simulate material flow during future Span calibrations.

For best results, if the new P7E value is not between 50% to 100% of the Design Rate (P1) value, perform an ECAL Adjust. Refer to Parameters/P22 ECAL Adjust.

ECAL CALIBRATION (Alternate Reference)

After the CompuScale III Span calibration is completed with a Test Weight (or Test Chain), ECAL may be used for subsequent Span calibration checks. Using ECAL as a Secondary Reference is especially useful when frequent Span calibration checks are required but using a Test Weight (or Test Chain) all the time would be impractical.

Select the ECAL Test Reference (P20=1). Adjust ECAL to the value desired (P22=2). Factor the adjusted ECAL reference to the current span. (P22=2 or P9). Refer to Parameters/P20 Test Reference Selection and P22 ECAL Adjust.

■

PARAMETERS

GENERAL

(F) indicates the parameter value factory setting (where applicable)
(V) indicates the parameter value may be viewed only.
(E) indicates the parameter value is essential for basic operation.

PARAMETERS

P0 RATE UNITS (E)

Defines the desired Rate display engineering units of measure.
With SW1, contact 5 (SW1-5) in the open position (Imperial units):

enter:	1 = tons per hour (F)(T/h)	1 T/h = 2000 lb/h
	2 = long tons per hour(LT/h)	1 LT/h = 2240 lb/h
	3 = pounds per hour(lb/h)	
	4 = pounds per minute(lb/min)	

With (SW1-5) in the closed position (Metric units):

enter:	1 = tonnes per hour (F)(t/h)	1 t/h = 1000 kg/h
	2 = kilograms per hour(kg/h)	
	3 = kilograms per minute(kg/min)	

The SW1-5 position and the value of P0 should be set before any other programming. To alter the Rate Units of a programmed CompuScale III, set SW1-5 as desired, perform a Reset (refer to Parameters/P99 Reset) and set P0 to the desired value.

P1 RATE (E)

Defines the rate of material flow (in P0 units) which will produce the full scale Rate output. (F=0.0000)
enter: Design Rate from Design Data Sheet, Range = 0.0001 to 99999

P2 LOCAL TOTAL (E)

Defines the amount of material to be totalized, prior to initiating an internal totalizer (and Main / Sub Total display) update, (F = 1). The weight portion of the Rate Unit (P0) is assumed.

enter:	.0001	.001	.01	.1	1	10	100	1000
	.0002	.002	.02	.2	2	20	200	2000
	.0005	.005	.05	.5	5	50	500	5000

If [TOTAL REGISTRATION TOO LOW] is displayed, enter a higher value.

P3 REMOTE TOTAL

Defines the amount of material to be totalized, prior to initiating a remote totalizer relay contact closure, (F = 1). The weight portion of the Rate Unit (P0) is assumed.

The frequency of remote totalizer contact closures is dependent upon the material flowrate and the Remote Total value. When a remote totalizer is connected to TB1-48,49, refer to the totalizer manufacturers instructions to determine the maximum pulse frequency. Lower values increase and higher values decrease the relay contact closure frequency.

enter:	.0001	.001	.01	.1	1	10	100	1000
	.0002	.002	.02	.2	2	20	200	2000
	.0005	.005	.05	.5	5	50	500	5000

If [TOTAL REGISTRATION TOO LOW] is displayed, enter a higher value.

P4 BELT SPEED (E)

Defines the design speed of the conveyor belt. Range = 0.0001 to 99999.

If SW1, contact 5 (SW1-5) is in the open position (Imperial units), the value is entered in feet/minute (ft/min). If (SW1-5) is in the closed position (Metric units), the value is entered in metres/second (m/s).

enter: Design Speed from Design Data Sheet (F = 0)

P5 SPEED CONSTANT (E)

Defines the constant to be multiplied to the speed sensor output frequency to establish the current belt speed. Range = 0.0001 to 99999.

If a speed sensor is utilized, the jumper across TB1-32,33 must be removed.
If a speed sensor is not utilized, TB1-32,33 must be jumpered
and the P5 value is irrelevant.

enter: Design Constant from Design Data Sheet (F = 0 if TB1-32,33 is not jumpered, otherwise F=100)

OR

The resultant value from the following calculation:

$$\text{speed constant} = \frac{\text{Speed Sensor Pulses Per Revolution*}}{\text{Pulley Circumference (m or ft) Per Revolution}}$$

* see speed sensor nameplate or consult Milltronics

P6 BELT LENGTH (E)

Defines the length of the conveyor belt which passes over the belt scale. Range = 0.0001 to 99999.

If SW1, contact 5 (SW1-5) is in the open position (Imperial units) the value is entered in feet (ft). If (SW1-5) is in the closed position (Metric units) the value is entered in metres (m).

enter: Belt Length from Design Data Sheet or measured belt length. (F = 0)

P7 TEST REFERENCE (Test Load) (E)

Defines the simulated load represented by the Test Reference selected (P20) for the Multispan (P26) selected.

If SW1 contact 5 (SW1-5) is in the open position (Imperial units), the value is entered in pounds/foot (lb/ft).If (SW1-5) is in the closed position (Metric units), the value is entered in Kilograms/metre (kg/m).

If a value of 0 is entered, the value required to simulate the Rate (P1) at the Belt Speed (P4) is automatically calculated and entered.

enter: Test Load from Design Data Sheet or refer to the associated belt scale instruction manual for calculation instructions. (F = 0 until P1 is set.)

P8 SPAN ADJUST

Adjusts the test reference calibration results to improve material flowrate measurement accuracy.

% CHANGE » Calculate the deviation between the CompuScale III Total and the actual material weight. A positive value reduces (negative increases) the Rate displayed.

$$\% \text{ Span Error} = \frac{\text{CompuScale III Total - Actual Material Weight}}{\text{Actual Material Weight}} \times 100$$

MATERIAL TEST » Alternatively, the automatic method may be used. Perform a material test as follows:

a) Run the belt empty, with the test reference (Test Weight, Test Chain, or ECAL) removed.

b) Select the MATERIAL TEST option, select the HOLD TOTAL or ADD TO TOTAL option, press "ENTER" to activate the Span Adjust totalizer.

c) Feed a sample of material onto the belt, press "ENTER" to stop the Span Adjust totalizer.

d) Enter the actual material sample weight. The Span Deviation % is displayed.

e) Press "Enter" to complete, (or "CLEAR" to abort), the procedure.

Span adjust calibrations are improved with larger material samples. Run at the normal load and speed; which should exceed 50% of the design Rate (P1).

A Span Adjust, utilizing either method, alters the span count of the Multispan number (P26) selected, and the Test Reference (P7) value of the Test Reference selected (P20). Copy the altered P7 value to the Programming Chart.

enter: 0 = Span Adjust not required (F)
1 = manual, (enter current deviation in percent)
2 = automatic, (enter the material test results)

P9 FACTORING

Adjusts the Test Reference value (P7) of the Test Reference selected (P20).

After the CompuScale III is calibrated utilizing a known Test Reference (e.g.Test Chain), the load represented by an unknown Test Reference (e.g. Test Weight(s) not supplied by Milltronics), may be established. This feature may also be used if Span calibrations performed with one Test Reference, tend to consistently provide greater accuracy than Span calibrations with another Test Reference.

Factoring is not required after a Span Adjust (P8), as all Test Reference values associated with the Multispan Number (P26) selected, are automatically factored by the CompuScale III.

After performing a Span calibration utilizing the known Test Reference (P20):

a) With the belt stopped, apply the unknown Test Reference.
b) Select the Test Reference to be adjusted (P20).
c) Run the empty belt at normal speed
d) press "1","ENTER" and wait for the Calibration Duration (P30 - Belt Revolutions). When complete,
e) copy the adjusted Test Reference (P7) value displayed, to the PROGRAMMING CHART.

If [ZERO CALIBRATION REQUIRED] is displayed, perform a Zero calibration prior to re- attempting the factoring procedure. If a Zero calibration has been performed recently, press "CLEAR","ENTER", and proceed.

enter: 0 = Factoring not required (F)
1 = Factoring required (with belt running empty, and selected Test Reference applied)

P10 LOW TOTAL CUTOFF

Defines the minimum belt scale load to be processed for Local Total values and Remote Total contact closures. Range = 0.0 to 100.0 This eliminates totalizer activity caused by the variable loading effect of an empty running belt.

With calibration complete, the belt running empty, and the Load displayed, observe the highest display value. Enter the value as a percent of LOAD (material load from Design Data Sheet or P55 display).

$$\text{Low Total Cutoff \%} = \frac{\text{Empty Belt Load}}{\text{Full Load}} \times 100$$

A value of 0 will permit the Total display to count up or down. Remote Total contact closures cease while the total counts down. The contact closures will resume when the Total display regains the amount by which it counted down.

enter: desired value (0 if certification is required, F = 3.0)

P11 RATE DISPLAY DAMPING

Defines the level of damping to be applied to the Rate display. Range = 1 to 999

This may be used to stabilize a fluctuating rate display without affecting accuracy. Higher values provide more stabilization. Press "Run" to instantly update the Rate display to the current rate.

enter: desired value (F = 1)

P12 LOAD DISPLAY DAMPING

Defines the level of damping to be applied to the Load display. Range = 1 to 999

This may be used to stabilize a fluctuating load display without affecting accuracy. Higher values provide more stabilization. Press "Run" to instantly update the Load display to the current load.

enter: desired value (F = 1)

P13 SPEED DISPLAY DAMPING

Defines the level of damping to be applied to the Speed display. Range = 1 to 999

This may be used to stabilize a fluctuating Speed display without affecting accuracy. Higher values provide more stabilization. Press "Run" to instantly update the Speed display to the current speed.

enter: desired value (F = 1)

P14 RATE OUTPUT DAMPING

Defines the level of damping to be applied to the Rate Output. Range = 1 to 999

This may be used to stabilize a fluctuating Rate Output without affecting accuracy. Higher values provide more stabilization. Rate Output Damping is disabled if the Rate Output Average (P15) feature is utilized. Press "Run" to instantly update the Rate Output to the current rate.

enter: desired value (F = 1)

P15 RATE OUTPUT AVERAGE

Defines the period in seconds between Rate Output updates. The value held, corresponds to the averaged Rate of the previous period. Range = 0 to 999. A value of 0 may be entered if Rate output averaging is not desired.

enter: desired value (F = 0)

P16 RATE BAR GRAPH ASSIGNMENT

Defines the output value the Rate Bar Graph Display represents, as a percent of span.

enter: 0 = Rate Output (P14) (F)
1 = undamped Rate
2 = Rate Display (P11)

P17 RATE OUTPUT MIN

Adjusts the Rate Output reference value for minimum material flowrate. Range = 0 to 4095.

a) With *Change Mode* activated and mA meter in series with the load connected to TB1-20,21.
b) Press "CLEAR" before keying in the estimated reference value, and pressing "ENTER".
c) Repeat step b) as required to produce the desired minimum Rate Output.

Briefly press "4" (increase by 10's), or "8" (decrease by 1's) to fine adjust the reference value, if necessary.

enter: 0 = no adjustment required
1 = Activate Change Mode (F = 631, for 4.00 mA)

P18 RATE OUTPUT MAX

Adjusts the Rate Output reference value for maximum material flowrate. Range = 0 to 4095.

a) With *Change Mode* activated and mA meter in series with the load connected to TB1-20,21.
b) Press "CLEAR" before keying in the estimated reference value, and pressing "ENTER".
c) Repeat step b) as required to produce the desired minimum Rate Output.

Briefly press "4" (increase by 10's), or "8" (decrease by 1's) to fine adjust the reference value, if necessary.

enter: 0 = no adjustment required
1 = Activate Change Mode (F = 3160, for 20.00 mA)

P19 SPEED ADJUST

Displays the measured belt speed. If the belt speed displayed is incorrect, the actual belt speed may be entered. The value entered must be in the same units of measure as P4.

To determine the actual belt speed:

a) Measure the belt length with a measuring tape.
b) Mark a point on the edge of the belt.
c) Run material on the belt at normal speed.
d) Monitor the time required for 1 or more* complete belt revolutions.

***Accuracy improves with the number of belt revolutions monitored.**

$$\textbf{ACTUAL SPEED} = \frac{\textbf{BELT LENGTH x NUMBER OF BELT REVOLUTIONS}}{\textbf{TIME}}$$

When a speed sensor is used, the P5 value is automatically adjusted.

When a speed sensor is not used, the P4 value is automatically adjusted.

A Zero and Span calibration is not required as a result of the use of this parameter.

enter: the actual belt speed (the adjusted parameter value is automatically displayed)

P20 TEST REFERENCE SELECTION

Defines the type of test reference selected to represent a material load.

The test reference selected is indicated when the following parameter is accessed.

OPTION	DESCRIPTION	TEST REFERENCE (P7)	SPAN ADJUST (P8)	FACTORING (P9)
0	Test Weight	[PARAMETER 7]	[PARAMETER 8]	[PARAMETER 9]
1	ECAL	[PARAMETER 7E]	[PARAMETER 8E]	[PARAMETER 9E]
2	Test Chain	[PARAMETER 7C]	[PARAMETER 8C]	[PARAMETER 9C]

When P20 = 1, ECAL is automatically applied whenever a Span Calibration or Factoring procedure is activated, and removed when the procedure is complete. Refer to Calibration \ Alternate Test References for ECAL span calibration instructions..

enter: 0 = load (F)(test weight)
1 = ECAL (electronic reference)
2 = test chain

P21 SENSOR TYPE (E)

Defines the type and number of load sensors providing the load signal(s) to the CompuScale III.

enter: 0 = LVDT (linear variable differential transformer)
1 = 1 load cell(MIC)
2 = 2 load cells (F)(MSI)
4 = 4 load cells(MMI-2)
8 = 8 load cells(MMI-3 or 4, LCPA-08 option required)

P22 ECAL ADJUST

Applies and permits the adjustment of the internal electronic test reference.

Refer to Calibration\Alternate Test References for ECAL Span calibration instructions.

ECAL Adjust cannot be accessed unless the ECAL Test Reference (P20) is selected.

ECAL is adjusted in the RUN mode with no material on the belt, or Test Weight applied to the belt scale. When the adjust option is selected, the simulated belt scale input is applied to the CompuScale III. Record all totalizer values before and after adjusting ECAL.

To adjust ECAL:

a) Enter the RUN mode before accessing P22 and selecting the adjust option.

b) Press "CLEAR" before keying in the estimated reference value, (range = 0 to 4095), and pressing "ENTER". If a Span calibration already exists, entering 0 automatically adjusts ECAL to 100% of the current span.

c) Repeat step b) as required while observing the Rate Bar Graph.

d) Briefly press "4" (increase by 10's) or "8" (decrease by 1's) to fine adjust the reference value, if necessary.

e) When the Rate Bar Graph indicates the desired simulated Rate, press "ENTER".

f) Press "ENTER" again to Factor ECAL to the current span and complete the adjustment.

enter: 0 = ECAL off, (if P20=1, ECAL will automatically be applied when a Span calibration, or Factoring process is activated, and removed when the process is complete.

1 = ECAL on, (ECAL will be held on except while a Zero calibration is in progress).

2 = ECAL Adjust (adjust as desired, F = 200).

P26 MULTISPAN

Defines the calibration result to be used for subsequent measurements. Range = 0 to 8.

This feature may be used to store the Span calibration results associated with different operating conditions, (e.g. change in conveyor incline, when an incline compensator is not utilized).

To perform a Span calibration for a specific operating condition:

a)Select the Multispan number to be associated with the current operating condition.

b)Enter the Test Reference value (P7) for the Test Reference selected (P20).

c)Perform a Zero and Span calibration. (If a Zero was performed recently, just perform a Span).

d) Perform a Span Adjust (P8) or Factoring (P9), as required.

To recall the calibration result (when the associated operating condition is re-encountered), select the appropriate Multispan number. The MultiSpan number may be selected by providing one or more temporary or permanent closed contacts between the TB1 COM (e.g. TB1-37) and the following TB1 terminals:

MULTISPAN NUMBER	TB1 TERMINALS CONNECTED TO COM			
	41	40	39	38
1	O	O	O	C
2	O	O	C	O
3	O	O	C	C
4	O	C	O	O
5	O	C	O	C
6	O	C	C	O
7	O	C	C	C
8	C	O	O	O

O = contact open

C = contact closed

For convenience, the Multispan number selection may be provided by a BCD switch connected to the appropriate TB1-38,39,40,41, and COM contacts.

Alternatively, the Multispan number may be selected via the keypad. If "0" is entered, the MULTISPAN field of the display is blank and Multispan 1 is utilized.

enter: desired value, (TB1-38,39,40, and 41 contacts must be open), (F=0).

P30 CALIBRATION DURATION (Belt Revolutions)

Defines the number of belt revolutions used for Zero and Span calibrations, Factoring (P9), and for Verification Totalizer (P31) operation. Range = 0.01 to 99, (decimal values may not be used for verification totalizer operation.

A low value reduces calibration time, while a high value increases calibration accuracy.

enter: desired value, (F = 1)

P31 VERIFICATION TOTALIZER

Activates a secondary internal totalizer which totals the amount of material conveyed during the number of belt revolutions set by P30. (The P30 value must be a whole number.) This feature may be used to verify calibration accuracy from the RUN mode without stopping material flow.

The amount of material totalized by the verification totalizer may be included or excluded from the main totalizer counts.

enter: 0 = verification totalizer off (F)
1 = do not totalize material during the verification.
2 = totalize material during the verification.

P32 VERIFICATION TOTALIZER RESOLUTION

Defines the amount of material weight to be measured, prior to initiating a verification totalizer update. The weight portion of the Rate Unit (P0) is assumed.

enter: 0 = same as the Local Total (P2) value.(F)
1 = 1/10 of the Local Total (P2) value.

P40 BAUD RATE

Defines the baud rate for PORT 1 data message communication.

The baud rate must be set to the value required by the external device(s) connected to the PORT1 (TB1) current loop or RS-232C communication connections.

enter: 300
1200
2400
9600 (F)

P41 DATA TRANSMIT INTERVAL

Defines the time lapse in minutes between unsolicited data message transmissions. Range = 0 to 99999

The Data Transmit Interval may be adjusted as required to control the level of message traffic between the CompuScale III and the external device(s) connected to the PORT 1 and/or PORT 2 bipolar current loop or RS-232C communications connections.

If a value greater than 50,000 is entered, the data message (P42) is transmitted only when the TB1- 35, 37 contacts are closed.

enter: desired value, (F = 30)

P42 DATA MESSAGE

Defines the ASCII message to be transmitted after every Data Transmit Interval (P41) or when TB1-35,37 contacts are closed.

The current time and date are transmitted with each message. The System message includes the value of parameters P0,1,2,3,4,5,6,7, and 21.

enter: 0 = no message (F)
1 = RATE
2 = TOTAL
3 = LOAD
4 = SPEED
5 = RATE, TOTAL, LOAD, and SPEED
9 = SYSTEM

P43 SERIAL PRINTER

Sets the communication mode to suit a serial printer.

enter: 0 = off (F)
1 = on (SW2-7 must be closed for Port 2 / printer communication)

P51 RELAY 1

Defines the operation of Relay 1 as a Rate, Load, or Speed Alarm.

The High Limit is the high alarm set point value which will cause the relay to de-energize. If a high alarm is not required, set the High Limit to 0.

The Low Limit is the low alarm set point value which will cause the relay to de-energize. If a low alarm is not required, set the Low Limit to 0.

The Deadband is the amount by which the High and Low Limit must be exceeded (above the low limit/below the high limit), before the relay energizes.

The Deadband value must be less than the difference between the High Limit and Low Limit. Otherwise, [ENTRY ERROR] is displayed when the offending parameter value entry is attempted.

If the Fixed rate alarm option is selected, the High Limit, Low Limit, and Deadband are fixed at preset values, which should be ideal for most applications.

enter: 0 = Relay 1 off (F) (always de-energized)
1 = RATE
2 = LOAD
3 = SPEED
4 = FIXED (Function = Rate, High Limit = 100, Low Limit = 20, Deadband = 2)

If Rate, Load, or Speed is selected, the High Limit may now be set.

enter: desired High Limit value, (Range = 0.000 to 100.0, F = 0), advances to Low Limit
desired Low Limit value, (Range = 0.000 to 100.0, F = 0), advances to Deadband
desired Deadband value, (Range = 0.000 to 100.0, F = 0)

P52 RELAY 2

Defines the operation of Relay 2 as a Rate, Load, or Speed Alarm.

The High Limit is the high alarm set point value which will cause the relay to de-energize. If a high alarm is not required, set the High Limit to 0.

The Low Limit is the low alarm set point value which will cause the relay to de-energize. If a low alarm is not required, set the Low Limit to 0.

The Deadband is the amount by which the High and Low Limit must be exceeded (above the low limit/below the high limit), before the relay energizes.

The Deadband value must be less than the difference between the High Limit and Low Limit. Otherwise, [ENTRY ERROR] is displayed when the offending parameter value entry is attempted.

If the Fixed rate alarm option is selected, the High Limit, Low Limit, and Deadband are fixed at preset values, which should be ideal for most applications.

enter: 0 = Relay 1 off (F) (always de-energized)
1 = RATE
2 = LOAD
3 = SPEED
4 = FIXED (Function = Rate, High Limit = 100, Low Limit = 20, Deadband = 2)

If Rate, Load, or Speed is selected, the High Limit may now be set.

enter: desired High Limit value, (Range = 0.000 to 100.0, F = 0), advances to Low Limit
desired Low Limit value, (Range = 0.000 to 100.0, F = 0), advances to Deadband
desired Deadband value, (Range = 0.000 to 100.0, F = 0)

P55 100% TEST REFERENCE (V)

Displays the material load required to produce the Rate (P1) of material flow at the design Belt Speed (P4).

This value is utilized for the calculation of the Low Total Cutoff (P10 value).

P60 SOFTWARE REVISION (V)

Displays the revision number of the software program stored in EPROM 1.

P61 MEMORY TEST (V)

Performs a test on the EPROM 1 memory. Upon completion, [CHECKSUM CORRECT] is displayed to indicate a successful test.

P63 TOTALIZER CONTACT DURATION

Defines the duration of the remote totalizer relay contact closure in seconds. Range = 0.025 to 8.323

This value is automatically set, based on the Rate (P1) and Remote Total (P3) values entered.
If necessary, adjust this value to provide the duration required by the device connected to TB1-51,52. An entered value is automatically adjusted to the next higher value permitted.

If the value entered is too high, [TOTAL REGISTRATION TOO LOW] will be displayed. Increase the Remote Total (P3) value.

When 0 is entered, the system selected value is entered

enter: desired value (F = 1, until P1 and P3 values are entered)

P64 ZERO RECORD (V)

Displays the number of operator initiated Zero calibrations performed since the last Reset (P99) or Initial Zero. Reset (P77), (F = 0).

P65 SPAN RECORD (V)

Displays the number of operator initiated Span calibrations performed since the last Reset (P99) or Initial Span. Reset (P88), (F = 0).

P66 SECURITY LEVEL

Defines the level of operator access permitted.

This feature may be utilized to ensure the programming and/or calibration is not inadvertently altered. Access to all RUN mode displays and the P66 value is permitted at all Security levels. When a security level is selected, security is not invoked until the RUN mode is entered. From the RUN mode, accessing P66 disables Security until the RUN mode is entered again.

enter: 0 = full access permitted (F)
1 = parameter values secured
2 = parameter and Total display values secured.
3 = parameter values, Zero and Span calibrations secured.
4 = parameter and Total display values, Zero and Span calibrations secured.

P70 CLOCK/CALENDAR

Defines the current Time and Date, to be maintained by the internal clock.

enter: desired value, (Hours, range = 0 to 23, advances to minutes),
desired value, (Minutes, range = 0 to 59, advances to day),
desired value, (Day, range = 1 to 31, advances to month),
desired value, (Month, range = 1 to 12, advances to year),
desired value, (Year, range = 00 to 99)

P71 TIME (V)

Displays time in twenty-four hour format, (HH:MM).

P72 DATE (V)

Displays date in YY/MM/DD format.

P77 INITIAL ZERO RESET

Performs a Zero Calibration to establish the new Initial Zero count value.

This feature is normally used in response to the [ZERO OUT OF RANGE] message, when the cause of the deviation is not otherwise correctable. This condition could occur as the result of an intended change in the Design Parameter values or a mechanical change to the belt or belt scale assembly.

enter: 0 = not required (F)
1 = Initial Zero Reset

P80 V/F CONVERTER OUTPUT (V)

Displays a reference count proportional to the input level from the belt scale. Range = 0 to 131,000.

This feature is normally used to verify the integrity of the belt scale load sensors and cables.

P81 LOAD CELL A (V)

Displays the input from the load cell connected to TB1-1,2 in mV. Range = 0.00 to 50.00.

Access to this parameter is gained when SENSOR TYPE (P21) is set to any value greater than 1. This feature is normally used to verify the integrity of the load cell after initial installation or subsequent replacement.

P82 LOAD CELL B (V)

Displays the input from the load cell connected to TB1-3,4 in mV. Range = 0.00 to 50.00.

Access to this parameter is gained when SENSOR TYPE (P21) is set to any value greater than 0. This feature is normally used to verify the integrity of the load cell after initial installation or subsequent replacement.

P83 LOAD CELL C (V)

Displays the input from the load cell connected to TB1-5,6 in mV. Range = 0.00 to 50.00.

Access to this parameter is gained when SENSOR TYPE (P21) is set to 4. This feature is normally used to verify the integrity of the load cell after initial installation or subsequent replacement.

P84 LOAD CELL D (V)

Displays the input from the load cell connected to TB1-7,8 in mV. Range = 0.00 to 50.00.

Access to this parameter is gained when SENSOR TYPE (P21) is set 4. This feature is normally used to verify the integrity of the load cell after initial installation or subsequent replacement.

P85 V/F CONVERTER INPUT (V)

Displays the sum of the amplified load sensor (P21) input voltage(s). Range = -1.00 to 4.00.

P88 INITIAL SPAN RESET

Performs a Span Calibration. The results of this calibration establish the new Initial Span count value.

This feature is normally used in response to the [SPAN OUT OF RANGE] message, when the cause of the deviation is not otherwise correctable. This condition could occur as the result of an intended change in the Design Parameter values or a mechanical change to the belt or belt scale assembly.

enter: 0 = not required (F)
1 = Initial Span Reset

P90 MSI NUMBER

Identifies the MSI to be balanced by advancing through parameters P91 through P95.

This parameter may only be accessed when Sensor Type (P21) is set to a value greater than 1.

Prior to initial calibration or following an MSI (dual load cell belt scale) load cell replacement, the load cell balancing procedure should be performed. When the load cell signals are balanced, variations in lateral material load distribution on the belt have less effect on measurements.

When the load cell balancing procedure is initiated, P91 through P95 must be accessed in sequence. Direct access to these parameters is not permitted.

The balancing procedure must be repeated for each MSI of an MMI (multiple MSI) belt scale application. For MMI applications, MSI's are numbered sequentially from 1 to a maximum of 4, starting from the MSI nearest the tail pulley and advancing toward the head pulley of the conveyor

When the load cell balancing procedure is completed (for all MSI's of an MMI application), perform a Zero and Span calibration before entering the RUN mode.

enter: 1 = MSI # 1, advance to P91 (F)
2 = MSI # 2, advance to P91
3 = MSI # 3, (LCPA-08 required)
4 = MSI # 4, (LCPA-08 required)

P91 POS B L/C (A + B) (V)

Displays the summed load cell input counts for:

MSI NUMBER (P90)	LOAD CELLS
1	A and B
2	C and D
3	E and F
4	G and H

With the belt stopped and completely empty, place the Test Weight on the test weight bar, near load cell: B (P90 = 1), D (P90 = 2), F (P90 = 3), or H (P90 = 4).

For LCPA-08 applications, close both LCPA-08 SW3 load cell contacts for the MSI # being balanced, open all other SW3 contacts.

enter : the displayed value (when stable) to advance to P92.

P92 POS B L/C (B) (V)

Displays the load cell input counts for load cell: B (P90 = 1), D (P90 = 2), F (P90 = 3), or H (P90 = 4).

For LCPA-08 applications, open the LCPA-08 SW3 contact for load cell: A (P90 = 1), C (P90 = 2), E (P90 = 3), or G (P90 = 4) contact.

Ensure the Test Weight (as applied for P91) is not moved or otherwise disturbed.

enter : the displayed value and advance to P93.

P93 POS A L/C (B) (V)

Displays the load cell input counts for load cell: B (P 90 = 1), D (P90 = 2), F (P90 = 3), or H (P90 = 4).

Move the test weight to the load cell: A (P90 =1), C (P90 =2), E (P90 = 3), or G (P90 = 4) side of the test weight bar.

Leave the LCPA-08 SW3 contacts undisturbed.

enter : the displayed value (when stable) to advance to P94.

P94 POS A L/C (A + B) (V)

Displays the summed load cell input counts for:

MSI NUMBER (P90)	LOAD CELLS
1	A and B
2	C and D
3	E and F
4	G and H

For LCPA-08 applications, close the LCPA-08 SW3 load cell contact opened for P92.

Ensure the Test Weight (as applied for P93) is not moved or otherwise disturbed.

enter : the displayed value to advance to P95.

P95 LOAD CELL BALANCE (V)

Displays the count value, which when entered, will balance the load cell signals for the MSI number selected.

For LCPA-08 applications, leave the LCPA-08 SW3 load cell contacts in the P94 position. Adjust the appropriate LCPA-08 balancing potentiometer until the P95 display value = 0 $\pm$ 5. Close all LCPA-08, SW3 contacts.

enter : the displayed value to complete the load cell balance.

P99 RESET

Initiates a complete memory reset.

This feature clears memory locations and restores parameter values to their original factory settings. The implementation of a Reset requires CompuScale III reprogramming and calibration.

Neither Reset Level affects the Clock / Calender settings. A Partial Reset maintains the previous, P17, P18, P20, P21, P22, P40, P41, P42 and P43, and load cell balancing settings.

enter: 0 = reset not required (F)
1 = Partial Reset
9 = Master Reset

P100 PARAMETER LIST (V)

Displays parameter names in groups of 10. Pressing "ENTER" advances the display to the next group. This parameter is not automatically scrolled and therefore must be accessed directly. ■

PROGRAMMING CHART

PAR	NAME	VALUE	VALID RANGE (F or _ = factory setting)
P0	RATE UNITS	[ ]	IMP: 1(T/h),2(LT/h),3(lb/h),4(lb/min) Metric: 1(t/h),2(kg/h),3(kg/min)
P1	RATE	[ ]	0.0001 to 99999 (F = 0.000)
P2	LOCAL TOTAL	[ ]	1,2,or 5 x .0001,.001,.01,.1,1,10,100,or 1000
P3	REMOTE TOTAL	[ ]	1,2,or 5 x .0001,.001,.01,.1,1,10,100,or 1000
P4	BELT SPEED	[ ]	0.0001 to 99999 (F = 0)
P5	SPEED CONSTANT	[ ]	0.0001 to 99999 (F = 0 for variable speed, 100 for constant speed)
P6	BELT LENGTH	[ ]	0.0001 to 99999 (F = 0)
P7	TEST REFERENCE	[ ]	0.0001 to 99999 (F = 0)
P8	SPAN ADJUST	[ ]	0 (off), 1 (% change), 2 (material test)
P9	FACTORING	[ ]	0 (off), 1(factor test reference)
P10	LOW TOTAL CUTOFF	[ ]	0.0 to 100.0 (F=3.00)
P11	RATE DISPLAY DAMPING	[ ]	1 to 999
P12	LOAD DISPLAY DAMPING	[ ]	1 to 999
P13	SPEED DISPLAY DAMPING	[ ]	1 to 999
P14	RATE OUTPUT DAMPING	[ ]	1 to 999
P15	RATE OUTPUT AVERAGE	[ ]	0 to 99999
P16	RATE BAR GRAPH ASSIGNMENT	[ ]	0 (Rate Output P14), 1 (undamped Rate), 2 (Rate Display, P11)
P17	RATE OUTPUT MIN	[ ]	0 to 4095 (F = 631)
P18	RATE OUTPUT MAX	[ ]	0 to 4095 (F = 3160)
P19	SPEED ADJUST	[ ]	0.0000 to 99999 (F = dynamic speed)
P20	TEST REFERENCE SELECT	[ ]	0 (test weight), 1 (ECAL), 2 (test chain)
P21	SENSOR TYPE	[ ]	0 (LVDT), 1 (1 load cell),2 (2 load cells), 4 (4 load cells), 8 (LCPA-08)
P22	ECAL ADJUST	[ ]	0 (off), 1(on), 2(adjust), [ ] count
P26	MULTISPAN	[ ]	0 to 8 (F = 0)
P30	CALIBRATION DURATION	[ ]	0.1 to 99 (whole numbers only for P31 operation, F = 1)
P31	VERIFICATION TOTAL	[ ]	0 (off), 1 (HOLD TOTAL), 2 (add to Total)
P32	VERIFICATION TOTAL RES	[ ]	0 (same as P2), 1 (P2 x 1/10)
P40	BAUD RATE	[ ]	300, 1200, 2400, 9600
P41	DATA TRANSMIT INTERVAL	[ ]	0 to 99999 (F = 30)
P42	DATA MESSAGE	[ ]	0 (off),1 (Rate),2 (Total),3 (Load),4 (Speed),5 (1,2,3,& 4),9 (System)
P43	SERIAL PRINTER	[ ]	0 (off), 1 (on)
P51	RELAY 1	[ ]	0 (off), 1 (Rate), 2 (Load), 3 (Speed), 4 (Fixed) [ ] (hi) [ ] (lo) [ ] (deadband) in %
P52	RELAY 2	[ ]	0 (off), 1 (Rate), 2 (Load), 3 (Speed), 4 (Fixed) [ ] (hi) [ ] (lo) [ ] (deadband) in %
P55	100% TEST REFERENCE	[ ]	0.0001 to 99999 (F = Rate (P1) / Speed (P4), display only)
P60	SOFTWARE REVISION	[ ]	1.00 to 99.99 (display only)
P61	MEMORY TEST	[ ]	Pass or Fail, (display only)
P63	TOTALIZER CONTACT DUR	[ ]	0.025 TO 8.323 seconds (F = 1 until P1 and P3 are set)
P64	ZERO RECORD	[ ]	(display only)
P65	SPAN RECORD	[ ]	(display only)
P66	SECURITY LEVEL SELECT	[ ]	0(off),1(P#'s),2(P#'s,Total),3(P#'s,Zero,Span),4(P#'s,Total,Zero,Span)
P70	CLOCK/CALENDAR	[ ]	hrs(0-23),min(0-59),day(1-31),month(1-12),year(00-99)
P71	TIME	[ ]	HH:MM, (24 hour format, display only)
P72	DATE	[ ]	YY/MM/DD format (display only)
P77	INITIAL ZERO RESET	[ ]	0 (off), 1 (reset)
P80	V/F CONVERTER OUTPUT	[ ]	0 to 131,000 counts, (display only)
P81	LOAD CELL A INPUT	[ ]	0.00 to 50.00 mV, (display only)
P82	LOAD CELL B INPUT	[ ]	0.00 to 50.00 mV, (display only)
P83	LOAD CELL C INPUT	[ ]	0.00 to 50.00 mV, (display only)
P84	LOAD CELL D INPUT	[ ]	0.00 to 50.00 mV, (display only)
P85	V/F CONVERTER INPUT	[ ]	-1.00 to 4.00 V, (display only)
P88	INITIAL SPAN RESET	[ ]	0 (off), 1 (reset)
P90	MSI NUMBER	[ ]	0 (non MSI), 1 to 4 (MSI from tail pulley)
P91	POS B L/C (A+B)	[ ]	0 to 131,000 counts
P92	POS B L/C (B)	[ ]	0 to 131,000 counts
P93	POS A L/C (B)	[ ]	0 to 131,000 counts
P94	POS A L/C (A+B)	[ ]	0 to 131,000 counts
P95	LOAD CELL BALANCE	[ ]	0 to 131,000 counts
P99	RESET	[ ]	0 (off), 1 (Partial), 2 (Master)
P100	PARAMETER LIST	[ ]	0 to 99 in groups of 10, (display only)

OPERATION

INITIAL OPERATION

Prior to the initial operation of the CompuScale III the following checks should be made:

» the test reference should be removed from the belt scale.
» the totalizer(s) should be reset to zero.

The CompuScale III is now ready for service.

Ensure the CompuScale III is in the RUN mode.

To enter the RUN mode,

The CompuScale III assumes the last RUN mode display accessed.

If necessary,

to display Load.

Apply material to the running belt, ensuring the Design Load is not exceeded.

to display the current belt speed. Ensure the design Speed is maintained.

to display the current material rate. Ensure the design Rate is not exceeded.

to display the current material total. Observe the total value incrementing.

A program of calibration checks should be performed weekly at first. The frequency of these checks may be reduced as time and experience dictate.

All personnel should be instructed on the safe and proper operation of the CompuScale III and be instructed when and if a calibration check should be performed, what level of zero and span deviation is acceptable, and when to reset the totalizer(s).

If desired, a photocopy of the following page may be provided to personnel responsible for CompuScale III daily operation.

NORMAL OPERATION

START UP

Ensure power is supplied to the CompuScale III. The following procedures may be performed on a routine basis, as required. Access to the Zero and Span calibration, and Reset Total functions may be restricted.

ZERO CALIBRATION CHECK

Ensure the belt scale test reference (Test Weight, ECAL, or Test Chain) is removed. Run the belt empty at normal speed until sufficiently limber.

to initiate a zero calibration. When complete (time dependent on programming) the deviation from the last Zero calibration is displayed.

if the zero deviation is acceptable.

If the zero deviation is not acceptable, or if [ZERO OUT OF RANGE] is displayed, investigate the reason for the deviation, correct the condition, and try the zero calibration again.

SPAN CALIBRATION CHECK

If used, ensure the correct Test Reference (P20) and Multispan Number (P26) are selected.

Apply the Test Reference (P20) to the belt scale. Run the belt empty at normal speed.

to initiate a Span calibration. When complete (time dependent on programming) the deviation from the span calibration is displayed.

if the span deviation is acceptable.

If the span deviation is not acceptable, or if [SPAN OUT OF RANGE] is displayed, investigate the reason for the deviation, correct the condition, and try the Span calibration again.

Stop the belt and remove the test reference (Test Weight, ECAL, or Test Chain) from the belt scale.

RESET TOTAL

If necessary, reset the CompuScale III totalizer.

to initiate a totalizer reset.

to select the Main or Sub Total.

to reset the selected Total display value to 0.

Refer to the manufacturers instructions to reset the remote totalizer, if any.

RUN

(and then

if necessary) to display Load.

Start the conveyor and activate the material prefeed control device (if any) to begin running material on the belt, while observing the material load.

to access the Speed display, observe the belt speed.

to access the Rate display, observe the material rate.

to access the Total display, observe the amount of material run on the belt since the last Total Reset. ■

COMMUNICATION

GENERAL

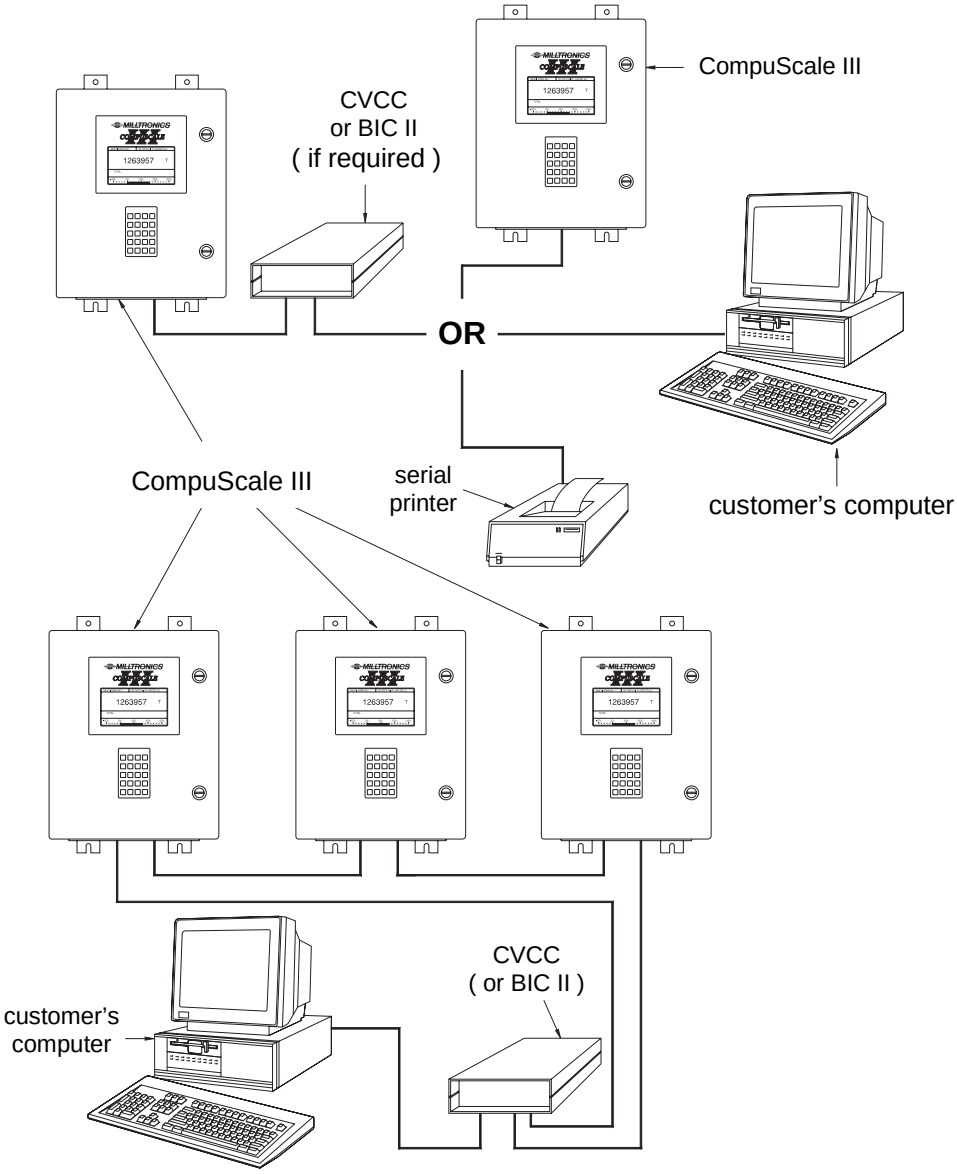
The CompuScale III may be operated in one of the following serial communication modes:

- » Remote (via an additional CompuScale III)
- » Host (IBM PC compatible computer or PLC)
- » Serial Printer

The Bipolar Current Loop may be utilized for cable runs up to 1500 metres (5000 ft). If communication with an RS-232C device is required, the Milltronics BIC-II or CVCC may be used to convert the Bipolar Current Loop to RS-232C. The BIC-II is also capable of Bipolar Current Loop to RS-422 conversion.

The CompuScale III RS-232 port may be connected directly to an RS-232C device, where the communication cable run is less than 15 m (50 ft).

To set the Port 1 communication baud rate to suit the device connected, refer to Parameters / P40. To set the Port 2 baud rate, refer to Start Up / Hardware Set Up.



REMOTE COMMUNICATION

This mode provides complete access to all CompuScale III functions via a remote mounted CompuScale III. To receive communication from the local CompuScale III PORT 1 or PORT 2 connection, SW2-6 of the remote CompuScale III must be closed.

HOST COMMUNICATION

Host communication permits up to 16 CompuScale III's (serially connected via PORT 1), to communicate with a computer or Programmable Logic Controller. Refer to Start Up\Hardware Set Up\Unit I.D. Code.

In this mode, data aquisition and analysis is accomplished by a customer supplied software package. Refer to Protocol.

SERIAL PRINTER COMMUNICATION

Two modes of serial printer operation are available.

The Port 1 mode (similar to previous Milltronics integrator versions) printout is initiated each time:

» a dry contact is provided across pins 7 and 17 of the printer DP25 connector.

» the Printer Test button is pressed.

The printout contains the: time, date, total, and total engineering units.

The Port 2 mode is compatible with any serial printer.

Close the CompuScale III SW2 contact 7 (SW2-7) and set the Data Transmit Interval (P41), Data Message (P42), and Serial Printer (P43) parameters as desired. Refer to Parameters.

The printout, containing the Data Message selected, is initiated each time:

» a dry contact is provided across the CompuScale III TB1-35 and COM (e.g. TB1-36)

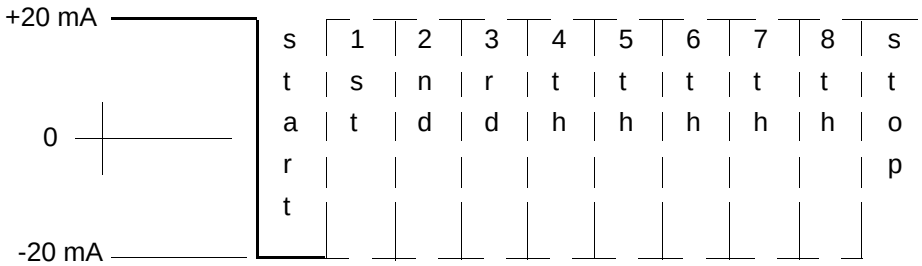
» the Data Transmit Interval elapses.

PROTOCOL

Protocol refers to the format, sequence and value of the data fields utilized in Host Mode communication messages. Each data field of a CompuScale III message contains one or more bytes of ASCII binary code.

Each byte contains:

» 8 data bits
» no parity bit
» 1 stop bit



DATA FIELD DESCRIPTIONS

The following data fields are utilized in CompuScale III, host mode messages.

som

CompuScale III start of message, ASCII character = STX (Hex Value = 02).

DEVICE

Identifies the CompuScale III to which the message applies. The device number equals the Unit I.D. code, as set by SW1 contacts 1 - 4. ASCII characters = 00 to 15.

MT

Identifies the message type transmitted, ASCII characters:

50 = material flow rate
51 = material load
52 = belt speed
53 = totalized material

READING

Contains the measurement value in the engineering units of measure selected during CompuScale III programming. The number of bytes in this data field will vary dependent upon the reading value. Up to 8 ASCII characters including the decimal point may be transmitted.

UNITS

Three ASCII characters identify the totalizer engineering units (MT = 53 only). The first character is always a space. The remaining characters may be:

t = Tonnes
T = Tons
LT = Long Tons
kg = Kilograms
lb = Pounds

eom

CompuScale III end of message, ASCII character = CR (Hex Value = 0D).

MESSAGE REQUESTS

Message requests must be transmitted from the host to the CompuScale III in the following format.

som DEVICE MT eom

Example:

Data Field	ASCII Character	Example Description
som	STX	start of message
DEVICE	01	for CompuScale III # 1
MT	50	material flow rate request
eom	CR	end of message

MESSAGE RESPONSES

The CompuScale III response to a flow rate (MT=50) load (MT=51) or speed (MT=52) message request will be in the following format.

som DEVICE MT READING eom

Example:

Data Field	ASCII Character	Example Description
som	STX	start of message
DEVICE	00	from CompuScale III # 0
MT	50	material flow rate response
READING	392.5	is 392.5
eom	CR	end of message

The response to a material total (MT=53) message request will be in the following format.

som DEVICE MT READING UNITS eom

Example:

Data Field	ASCII Character	Example Description
som	STX	start of message
DEVICE	00	from CompuScale III # 0
MT	53	material total response
READING	129.2	is 129.2
UNITS	MT	Metric Tonnes
eom	CR	end of message

■

ALPHABETICAL PARAMETER LISTING

PARAMETER NAME	PARAMETER NUMBER	PARAMETER NAME	PARAMETER NUMBER
Baud Rate	P40	Multispan	P26
Belt Length	P6	Parameter List	P100
Belt Speed	P4	Rate	P1
Calibration Duration	P30	Rate Output Average	P15
Clock/Calendar	P70	Rate Output Max	P18
Converter Input (V/F)	P83	Rate Output Min	P17
Converter Output (V/F)	P80	Rate Units	P0
Damping, Load Display	P12	Record, Zero	P64
Damping, Rate Bar Graph	P16	Record, Span	P65
Damping, Rate Display	P11	Relay 1	P51
Damping, Rate Output	P14	Relay 2	P52
Damping, Speed Display	P13	Reset	P99
Data Transmit Interval	P41	Security	P66
Data Message	P42	Sensor Type	P21
Date	P72	Serial Printer	P43
ECAL Adjust	P22	Software Revision	P60
Factoring	P9	Span Adjust	P8
Initial Zero Reset	P77	Speed Adjust	P19
Initial Span Reset	P88	Speed Constant	P5
Load Cell Balance	P95	Test, Memory	P61
L/C Balance, MSI Number	P90	Test Reference	P7
L/C Balance, POS B (A+B)	P91	Test Reference 100%	P55
L/C Balance, POS B (B)	P92	Test Reference Selection	P20
L/C Balance, POS A (A+B)	P94	Time	P71
L/C Balance, POS A (B)	P93	Total Contact Duration	P63
Load Cell Input, A	P81	Total, Local	P2
Load Cell Input, B	P82	Total, Low Cutoff	P10
Load Cell Input, C	P83	Total, Remote	P3
Load Cell Input, D	P84	Total, Verification	P31
		Total, Verification Resolution	P32

MAINTENANCE AND SPARE PARTS

MAINTENANCE

The CompuScale III requires no maintenance. However, a program of periodic preventative maintenance should be initiated. This should include regular inspection, general cleaning and good housekeeping practices.

Enclosures and printed circuit boards should be cleaned only when the power is disconnected at the main breaker. The use of a vacuum cleaner to remove foreign material dislodged with a clean dry paint brush is recommended. Check all electrical connections for signs of corrosion and/or electrical arcing.

The CompuScale III memory backup and calibrator batteries should be replaced annually. The 3.6 Volt lithium battery (located on the mother board top right corner) should only be replaced while the CompuScale III power is **ON**. The 9 Volt calibrator battery is located on the back of the CompuScale III door.

SPARE PARTS

The following list describes the CompuScale III components which may be ordered as a spare part. The ITEM # refers to the number which should be included on the purchase order to identify the part required.

DESCRIPTION	ITEM #
Battery, Lithium, 3.6 V, AA, (Memory)	20200031
Battery, Alkaline, 9 Volt, (Calibrator)	20200025
Enclosure Bottom Plate	24650116
Fuse, 0.25A, 250V, Slo-Blo, CSA, (Speed Sensor)	22550070
Fuse, 0.75A, 250V, Slo-Blo, CSA, (Main)	22550112

For other spare part ordering information, contact Milltronics or your distributor.

ERROR MESSAGES

The following messages may be encountered during CompuScale III programming, calibration, or operation.

DISPLAY MESSAGE	DESCRIPTION
[ABORTED]	The activated process or procedure was not completed correctly (or before "CLEAR" was pressed). Retry the feature attempted.
[AUTO ZERO ABORTED]	The Auto Zero was more than 2% of span from the last operator Zero before SW1-6 was closed. Refer to Calibration/Certification Mode.
[AUTO ZERO LIMIT EXCEEDED]	The Auto Zero was more than 2% of span from the last operator Zero. Refer to Calibration/Auto Zero.
[CALIBRATION ABORTED]	"CLEAR" was pressed before the activated calibration was complete.
[CERTIFICATION LOCKOUT]	Attempted access to a function restricted during operation in the Certification mode. Refer to Start up/Hardware Set Up/Certification.
[CHECKSUM ERROR]	Integrator failed Memory Test. Refer to Parameters/P61 Memory Test.
[ENTRY ERROR]	Invalid parameter selection or alteration. Refer to Parameters.
[PARAMETERS NOT ENTERED]	A calibration or run mode operation was attempted before essential parameter values were entered. Refer to Parameters.
[REMOTE TOTAL SATURATION]	The systems totalization capabilities were exceeded; the Remote Total counts are incorrect. Refer to [TOTAL REGISTRATION TOO LOW].
[SECURITY LOCKOUT]	Attempted access to a function which is restricted by Security (P66). Refer to Parameters/P66 Security.
[SPAN CALIB REQUIRED]	Attempted RUN mode operation prior to accepting an initial Span calibration. Refer to Calibration/Span.
[SPAN ERROR]	The attempted calibration (or adjustment) would have exceeded the systems span capabilities. Investigate and correct before retrying.
[SPAN OUT OF RANGE]	The attempted Span calibration was greater than 12% of span from the Initial Span reference. Refer to Parameters/P88 Initial Span Reset.
[SPEED < 5%]	The current belt speed is less than 5% of the Design Belt Speed (P4).
[SPEED < 5%; CALIB ABORTED]	The calibration attempted was aborted due to an abnormally low belt speed.
[TEST REFERENCE VALUE REQUIRED]	A Test Reference value (P7) has not been entered for the current Test Reference selected (P20). Refer to Parameters.
[TOTAL REGISTRATION TOO LOW]	The value entered exceeds the systems totalization capabilities. Refer to Parameters/P2 Local Total, P3 Remote Total & P63 Contact Duration.
[ZERO CALIB REQUIRED]	Attempted RUN mode operation or Span calibration prior to accepting an initial Zero calibration. Refer to Calibration/Zero.
[ZERO CALIB REQUIRED] [OR PRESS CLEAR]	Span or Factoring (P9) attempted from the RUN mode since the last Zero calibration. Press "CLEAR" only if a Zero calibration was performed recently.
[ZERO OUT OF RANGE]	The attempted Zero calibration was greater than 12% of span from the Initial Zero reference. Refer to Parameters/P77 Initial Zero Reset.

TROUBLE SHOOTING

Every CompuScale III integrator is subjected to extensive quality assurance procedures to ensure the highest possible degree of quality, reliability, and performance is achieved.

The following listing indicates the probable cause, and proper course of action to be taken should the specified fault symptom occur.

SYMPTOM	CAUSE	ACTION
Display blank	» Loss of power	» check power wiring, jumpers, and fuses » check POWER switch is ON » check AC supply » check display board HD2 - 1,4
Will not complete a Zero or Span calibration	» Loss of input signal(s)	» check P80 - 84 (load) » check P19 (speed) » check load sensor wiring » check speed sensor wiring or constant speed jumper
	» Wrong Design Parameter	» check programming value(s)
Calibration takes too long	» Calibration Duration too long	» reduce P30 value
Zero calibration deviation drifts	» Loose mechanical assembly	» tighten all bolts and clamps
	» Material build up on belt	» run belt empty as long as practical before Zero
Span calibration deviation drifts	» Loose mechanical assembly	» tighten all bolts and clamps
Accuracy is not within desired limits	» Test Reference doesn't represent true operating conditions	» perform Zero and Span calibration, followed by a Span Adjust (P8)
	» Calibration Duration too low	» increase P30 value *
	» Belt Length (P6) incorrect	» enter correct Belt Length (P6)*
	» Belt Speed (P4) incorrect	» perform Speed Adjust (P19)
	» Load cell signals not balanced	» perform load cell signal balance (P90 - P95)*
	» Conveyor incline varies	» Install a Milltronics Incline Compensator*

* Perform a new Zero and Span calibration, and a Span Adjust (P8) after the recommended action.

For more trouble shooting information, refer to the belt scale and application guideline instruction manuals.

■

OUTLINE and MOUNTING

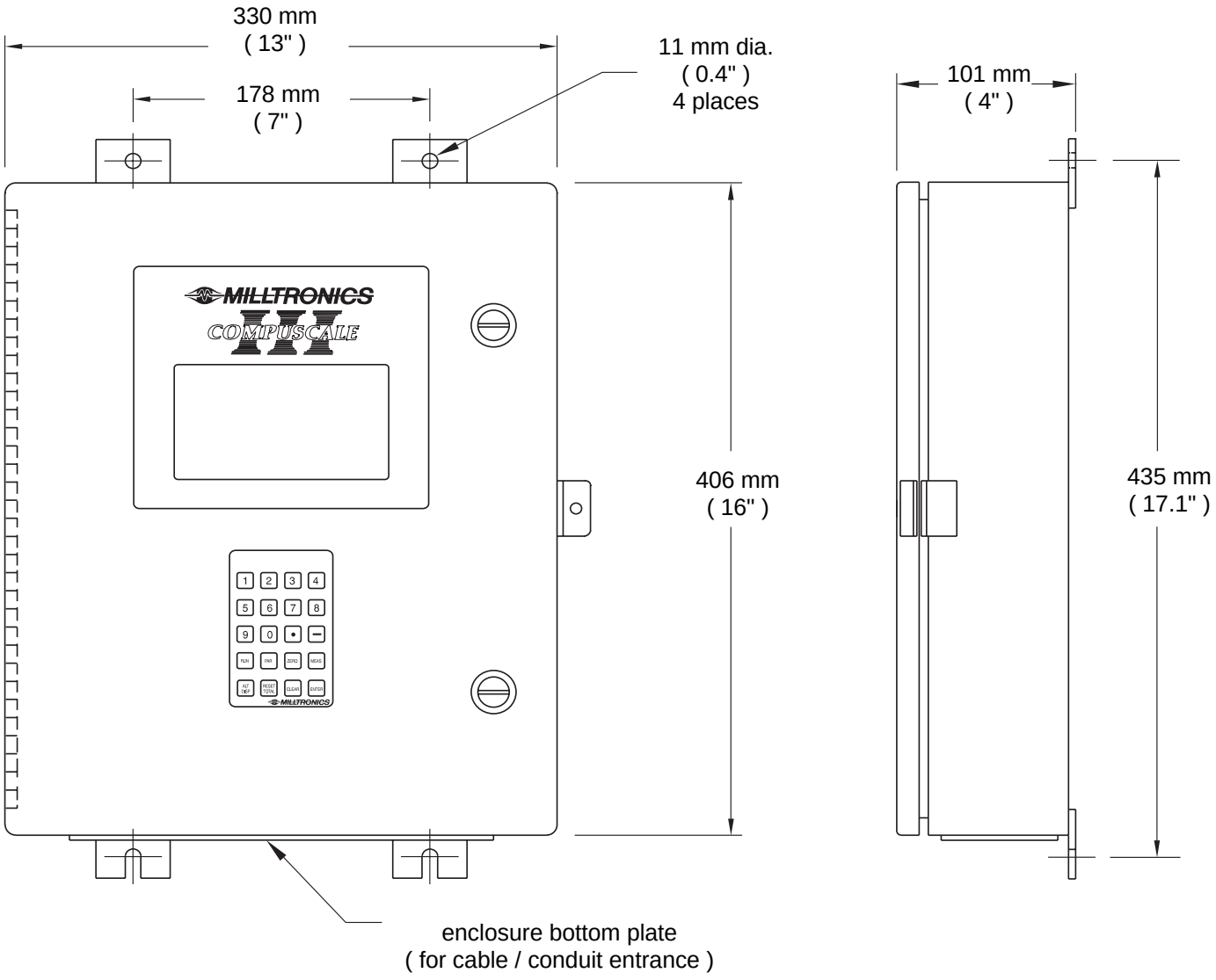


FIG. 1

COMPUSCALE III LAYOUT

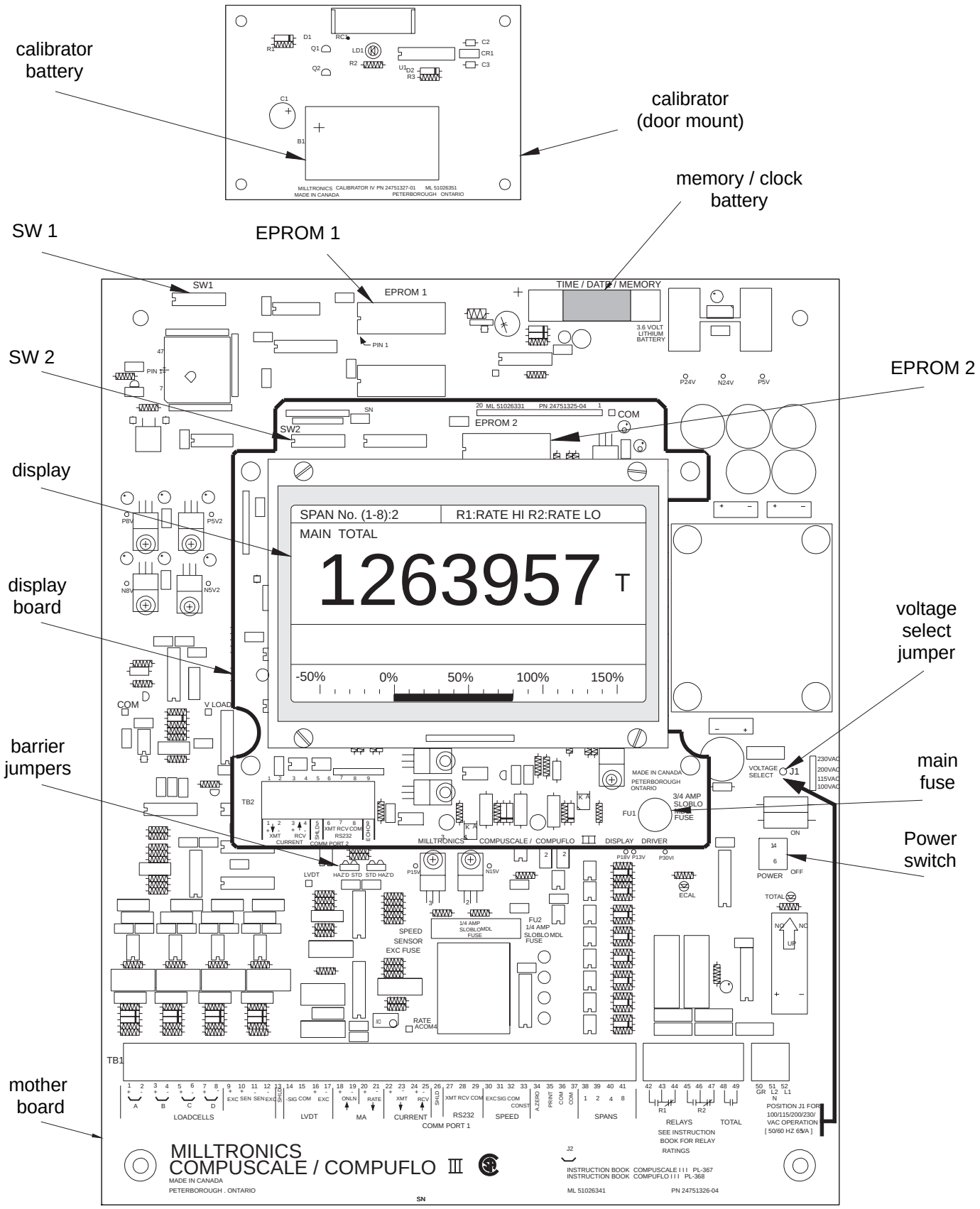
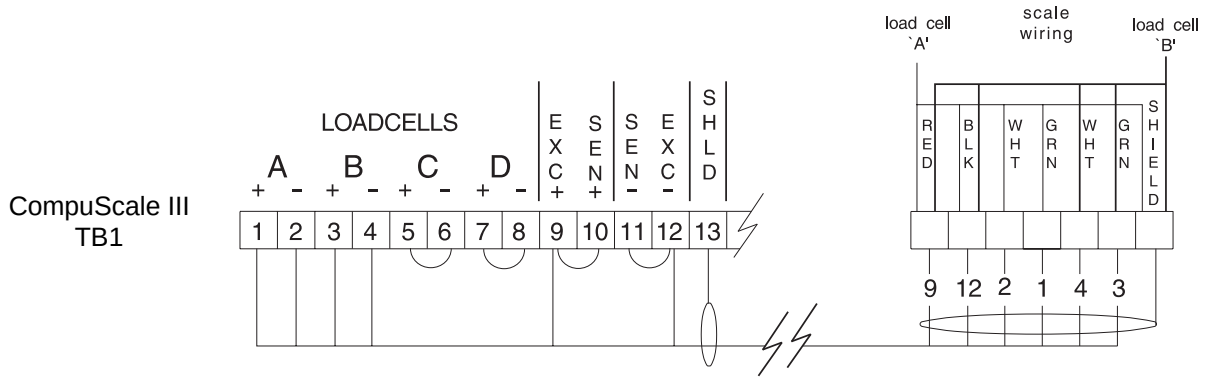


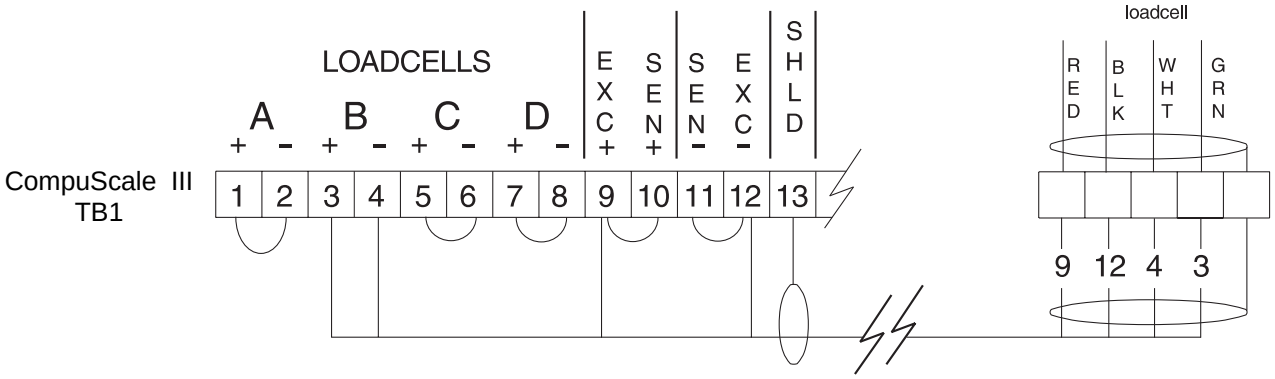
FIG. 2

COMPUSCALE III / BELT SCALE INTERCONNECTION

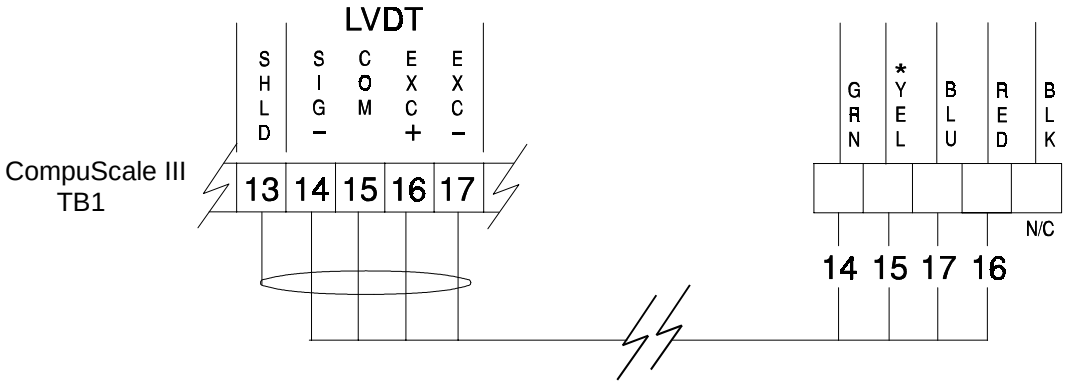
MSI (DUAL LOAD CELLS)


load cell `A'
scale wiring
load cell `B'
CompuScale III TB1
LOADCELLS
A B C D
EXC+ SEN+ SEN- EXC- SHLD
1 2 3 4 5 6 7 8 9 10 11 12 13
RED BLK WHT GRN WHT GRN SHIELD
9 12 2 1 4 3

MIC (SINGLE LOAD CELL)



LVDT



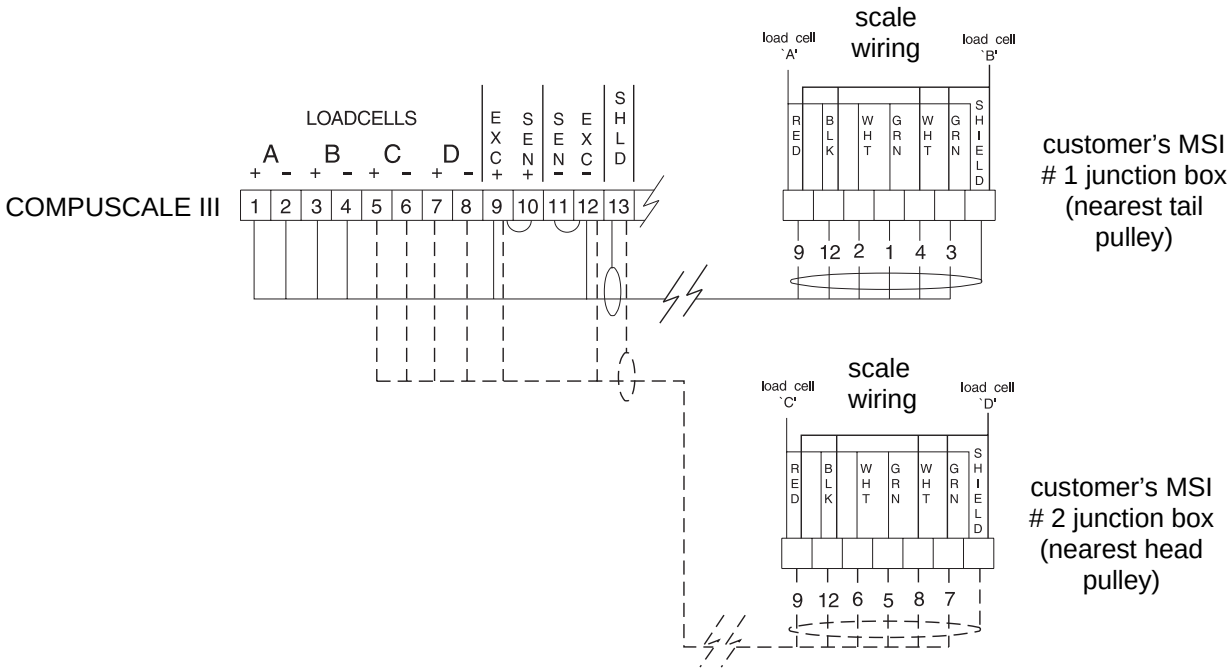
1. Where a belt scale must be installed in a hazardous area consult Milltronics or your distributor for wiring instructions.

2. Where the integrator to load cell belt scale cable exceeds 150m (500 ft):
   A) remove jumpers from Compuscale III, TB1 - 9,10 and TB1 - 11,12
   B) run an additional shielded conductor to the junction box nearest the load cell(s) from:
      » Compuscale III TB1 - 10 to loadcell(s) red
      » Compuscale III TB1 - 11 to loadcell(s) black

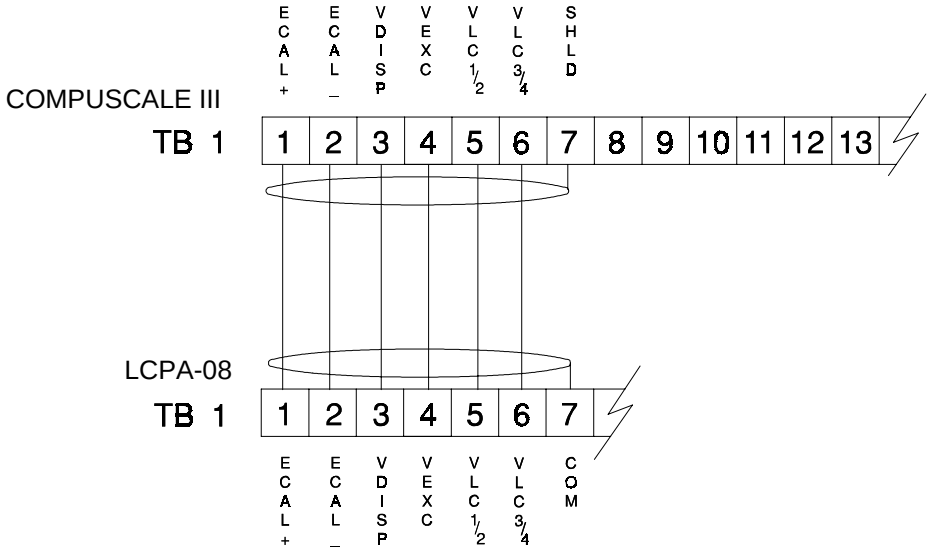
FIG. 3

COMPUSCALE III / BELT SCALE INTERCONNECTION

MMI-2 APPLICATIONS


scale wiring
load cell `A'
load cell `B'
LOADCELLS
A B C D
EXC+ SEN+ SEN- EXC- SHLD
COMPUSCALE III
1 2 3 4 5 6 7 8 9 10 11 12 13
RED BLK WHT GRN WHT GRN SHIELD
9 12 2 1 4 3
customer's MSI # 1 junction box (nearest tail pulley)
scale wiring
load cell `C'
load cell `D'
RED BLK WHT GRN WHT GRN SHIELD
9 12 6 5 8 7
customer's MSI # 2 junction box (nearest head pulley)

COMPUSCALE III / LCPA-08 INTERCONNECTION


ECAL+ ECAL- VDISP VEXC VLC1/2 VLC3/4 SHLD
COMPUSCALE III
TB 1
1 2 3 4 5 6 7 8 9 10 11 12 13
LCPA-08
TB 1
1 2 3 4 5 6 7
ECAL+ ECAL- VDISP VEXC VLC1/2 VLC3/4 COM

(Refer to the LCPA-08 instruction manual for LCPA-08 / Belt Scale Interconnection)

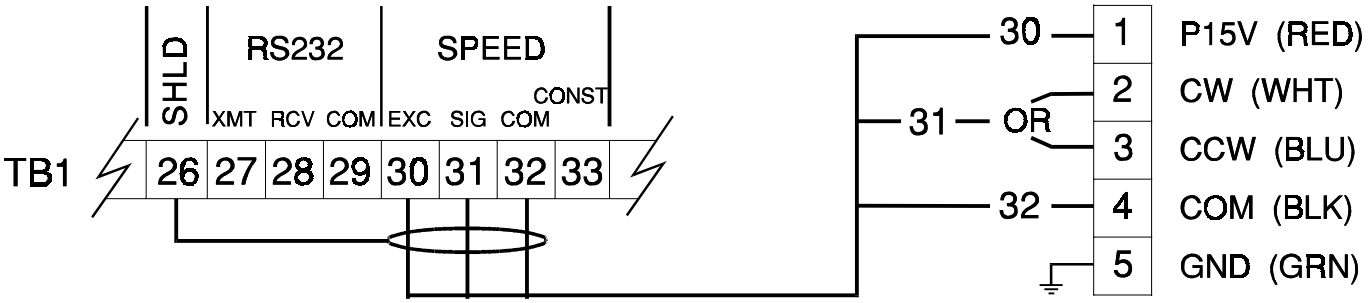
1. Where a belt scale must be installed in a hazardous area consult Milltronics or your distributor for wiring instructions.

2. Where the integrator to load cell belt scale cable exceeds 150m (500 ft):
   A) remove jumpers from Compuscale III, TB1 - 9,10 and TB1 - 11,12
   B) run an additional shielded conductor to the junction box nearest the load cell(s) from:
      » Compuscale III TB1 - 10 to loadcell(s) red
      » Compuscale III TB1 - 11 to loadcell(s) black

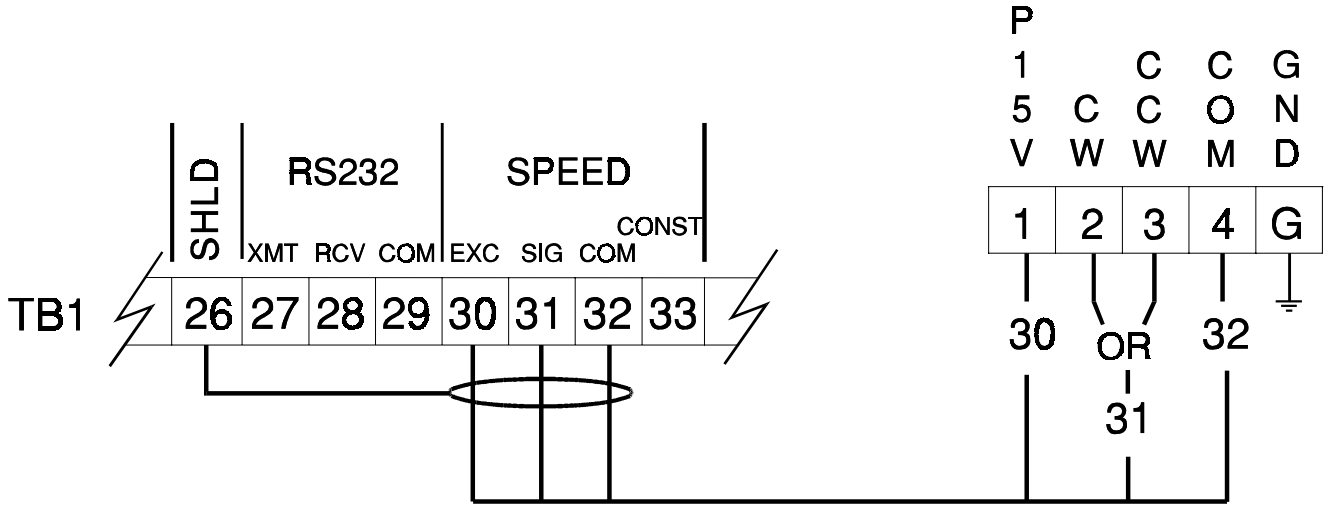
FIG. 4

COMPUSCALE III / SPEED SENSOR INTERCONNECTION

MD - 2000A



MD - 36



1. Remove the Compuscale III TB1 - 32,33 jumper prior to connecting ther speed sensor.

2. Connect Compuscale III TB1 - 31 to the speed sensor junction:
   Position 2 for clockwise speed sensor shaft rotation
   Position 3 for counter clockwise speed sensor shaft rotation

3. If a speed sensor is not used the Compuscale III TB1 - 32,33 jumper must be in place.

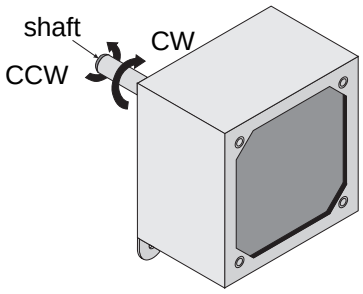
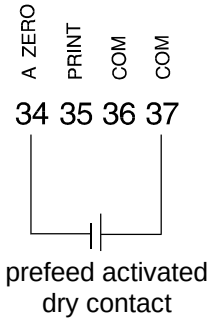


FIG. 5

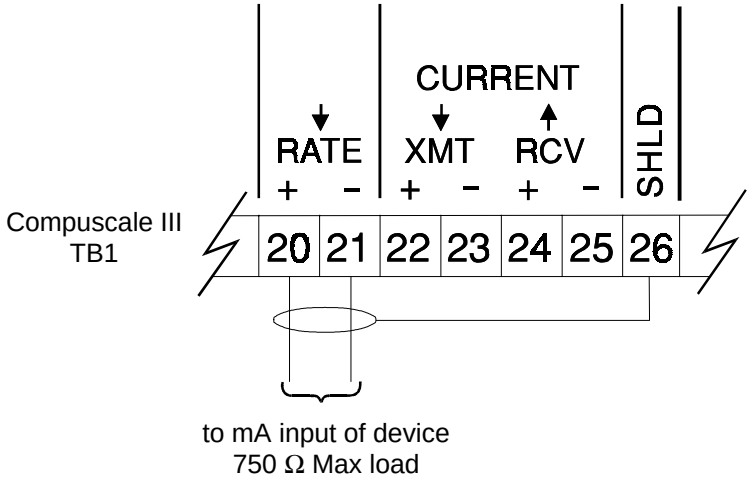
POWER, AUTO ZERO & RATE OUTPUT WIRING

POWER

AUTO ZERO



RATE OUTPUT



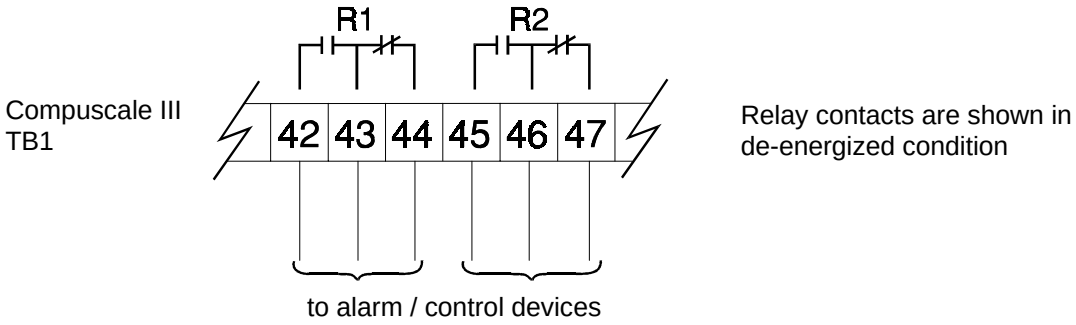
1. Ensure the Compuscale III J1 position matches power to be applied to TB1 - 51,52.

2. The Auto Zero contact must be closed when the material feed is stopped, if Auto Zero calibration is desired.

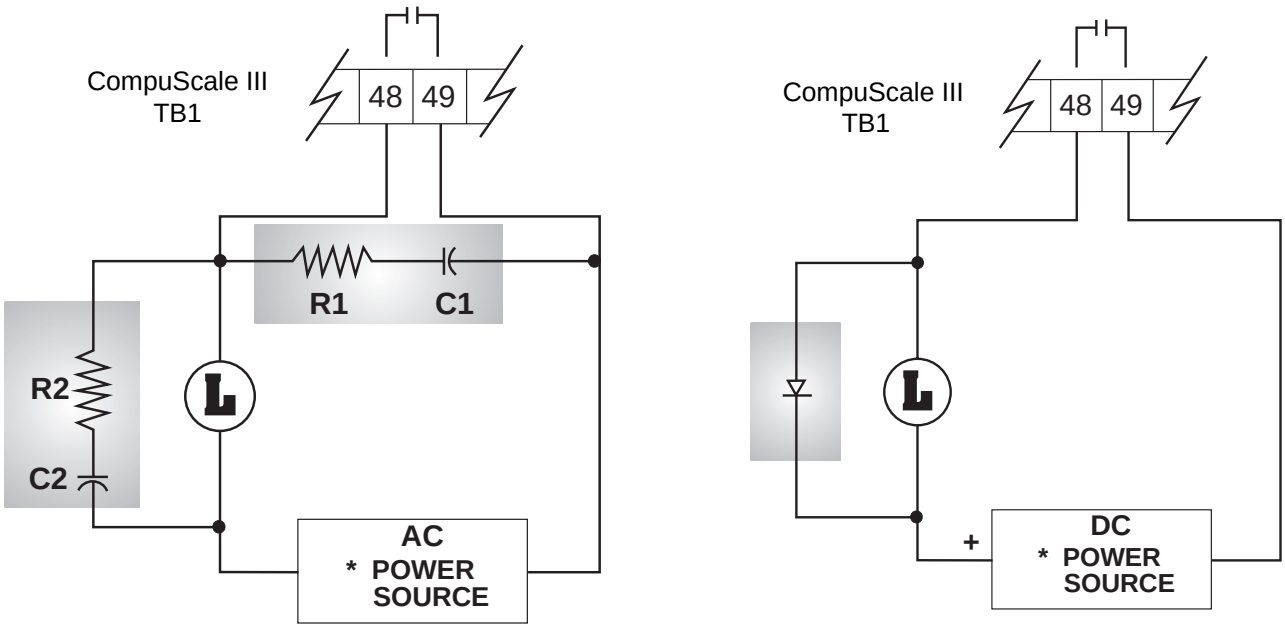
FIG. 6

RELAY WIRING

ALARM / CONTROL RELAYS



REMOTE TOTALIZER RELAY



Shaded area recommended for
inductive load (L)

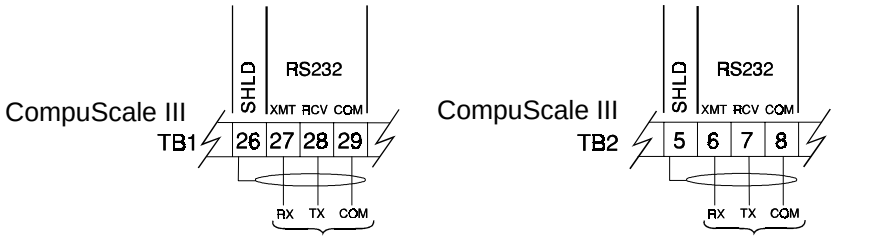
R1 = R2 = 20 to 30 W
C1 = .01 to .1 mFd, 500 V
C2 = .001 to .01 mFd, 500 V

* Some totalizers have an internal
power source.

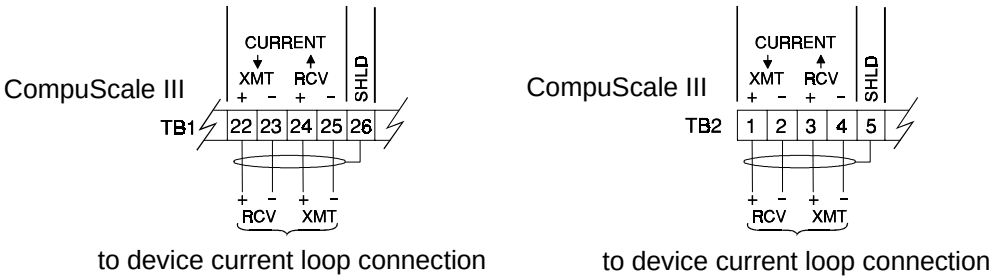
FIG. 7

COMMUNICATION WIRING

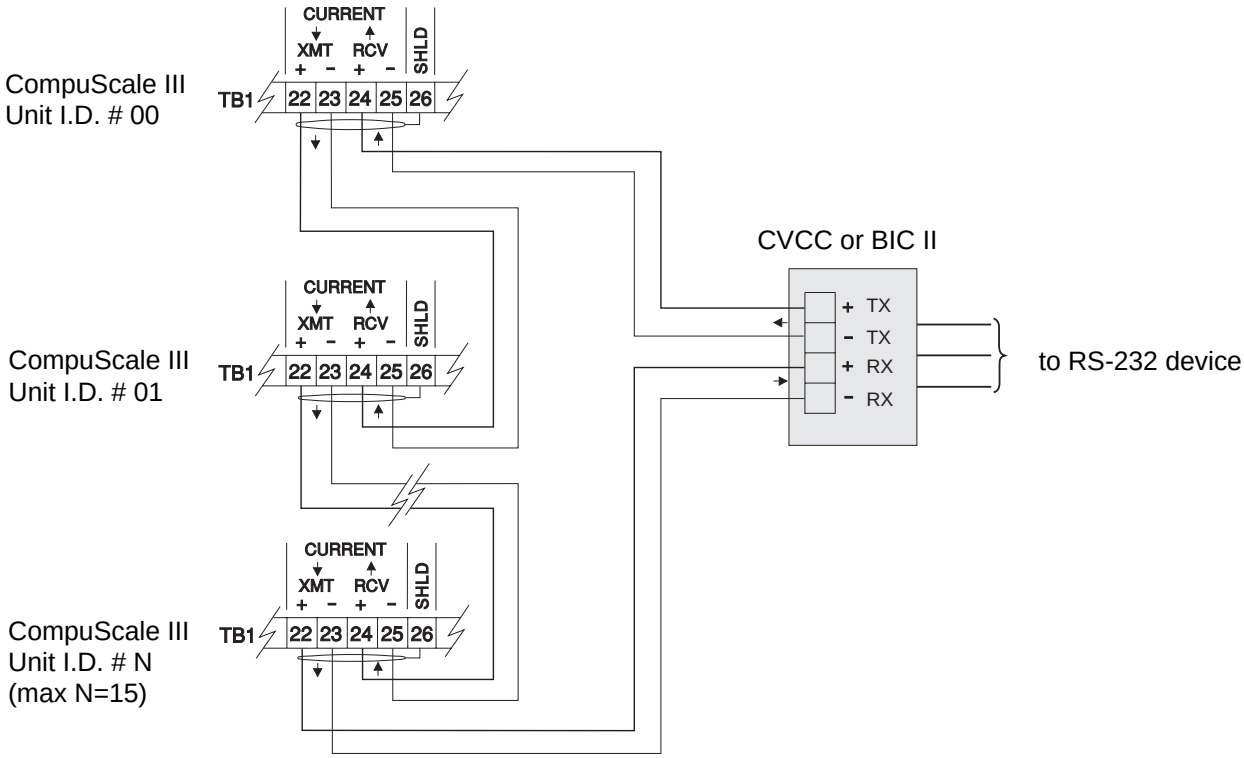
RS - 232



CURRENT LOOP



MULTIPLE CURRENT LOOP



1. Power may be disconnected from any CompuScale III in a multiple current loop without affecting the communication of the other CompuScale III's.

FIG.8

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